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## *Original Communications*

# FADS AND THEIR EFFECTS

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FROM the title of this paper it may be necessary to state that in considering fads I have no reference to those delightful interests which professional men so often have in matters outside their own particular calling, and which are so very salutary in diverting attention from the daily routine and continued stress of intense professional activity. These outside interests, unless they are carried to the excess of an obsession that detracts seriously from the efficiency of professional achievement, are wholly commendable and beneficial, and should be encouraged on the part of professional men. They are broadening in their influence, and they invariably lend a zest to life, adding materially to a man's ability, his range of vision and his ultimate happiness.

The fads referred to in this paper are those connected with methods of practice and new ideas which, at intervals, are introduced in the profession; which for a time absorb the interest of its members, almost to the exclusion of everything else, and which, consciously or unconsciously, change the vision of those indulging in them from a broad and comprehensive view of things to the narrow confines of the one particular thing, which for the moment claims attention.

In the history of human progress, it is found that fads have, for good or ill, played a large part in our activities. This is particularly true of the development of the professions of medicine and dentistry. Sometimes, a fad has been confined to a small group of men or even

to one man alone; at other times, it has swept the profession from one end of the land to the other. Like a bell-wether sheep, the originator of the fad has led the profession over the fence of conservatism into the pasture of fanaticism, where they have fed plenteously on the herbage of irrationalism. Not that all fads have been bad, or that they have uniformly been productive of harm—not that much good has not at times resulted from the enthusiasm developed by following a fad; but it is safe to say that the sum total of the effects of fads has been to leave more disaster in their wake than concrete good.

Let us review briefly a few of the fads that have swept the profession, and sum up their effect. Dating back farther than men of the present generation can recall, we have the fad of filing teeth for the purpose of creating what were erroneously called self-cleansing spaces, on the more or less plausible theory that this practice would do away with the tendency to decay in the proximal surfaces. It had been observed that most cavities began in those surfaces, and the idea became very alluring that, by grinding away the tooth so as to leave large V-shaped apertures looking toward the lingual surface, the opportunity for the lodgment of food would be eliminated and the incidence of caries minimized. The plausibility of the idea led some of our foremost operators to resort to this practice, with the pathetic result that many of the patients so treated were rendered almost helpless in the matter of efficient mastication through the wedging of food between the teeth. It is quite unnecessary in this day of enlightenment on the significance and function of the interproximal space and contact point to enlarge on the disastrous results of such a procedure as this; but, at the time of its advocacy, this fad took a strong hold on the profession. Nothing but the bitter experience of its victims stopped the fad, and brought the practitioners to their senses.

When the so-called "New Departure Creed" came out in the late seventies and early eighties, it created a real furore in the profession. Men who were too inefficient or too lazy or too indifferent to master the manipulation of gold hid their delinquency behind the foolish statements that "In proportion as teeth need saving, gold is the worst material to use," and "Guttapercha properly used is the most permanent filling we possess." Other statements equally absurd were freely made by men of influence, till the fad of the plastics threatened to sweep gold foil from our list of filling materials. Fortunately, some of our sane and conservative practitioners stood firm in their advocacy of the virtue of gold, and thus saved the day. The grotesque claims for the plastics served only to distort the vision and judgment of men as to their real place in the profession, and the sum total of the New Departure movement was to bring about more harm than good. It was merely another fad gone wrong.

A certain fad of more or less ancient lineage was the one of hypnotism for the painless performance of dental operations. Happily, this fad did not run a very lengthened course on account of the almost instant rebellion on the part of patients, but the fact that this subject formed the theme of a paper before the general session of the World's Columbian Dental Congress in 1893 showed the estimate in which it was held by some of our leading men. It is necessary only to use our common sense to see the folly of such a fad as this.

A little later in our history, we were swept with the cataphoresis fad, and only those who passed through this pe-

riod can visualize the extent to which it gripped the profession. From one end of the land to another, it left in its wake nothing but a vast assortment of electrical apparatus that was merely an encumbrance in every office. The net result of cataphoresis was a great and cruel waste to the profession, and a sad disappointment to the people.

Another fad was that of copper amalgam. This material threatened at one time to displace all other plastics, and its virtues were heralded from coast to coast. It was only after a thorough trial on the part of many men that its limitations were made manifest, and it gradually dropped from sight. Today, if it is used at all, it is only for the purpose of making models for inlay or crown restorations—a use for which, by the way, it is admirably adapted.

The use of emetin in the treatment of pyorrhea (alveolaris) will be recalled by many, and when we look back on the experiences of those days, we can only blush for the extent to which this remedy was forced on a helpless public. The fact that it was all done with the best intentions goes only a short way toward ameliorating the embarrassment with which we must recall this period of our practice. It is well that a merciful public forgets and forgives.

Analgesia for cavity preparation also had its run, and when it was at its height, it required a great deal of temerity on the part of a speaker or writer to utter a word in its disparagement. A man was heralded as brutal and indifferent—worse than this, he was called an old fogy in public print—who dared to oppose the practice of administering gas for the filling of teeth. The most apparent effect of this fad was to create a lot of irresponsible and cowardly patients, and an unfortunate crop of dead pulps.

An entirely different kind of practice, one which had much to commend it, and yet in the light of our practical experience with it must be classed as a fad, was the porcelain inlay. The inherent virtue of the porcelain inlay in some of its aspects does not entirely minimize the fact that the extent to which it was used and the enthusiasm associated with it constituted it as faddish in the truest sense. It is only necessary to compare the number of porcelain inlays inserted today with those used fifteen or twenty years ago to judge as to whether or not their employment was a fad. But it was such a delightful fad, and with so insistent an appeal, that we cannot find it in our hearts to censure anyone for following it. The advent of the porcelain inlay increased the esthetic perception of the dentist to an extent never before approached, and while it left in its wake a large percentage of failures and disappointments, its many possibilities gave it a place that could not be ignored; in other words, it had its compensations as well as its penalties and limitations. In some respects, the rise of the porcelain inlay forms an agreeable restrospect in our professional experience, and we need have little regret in its contemplation.

Coming to more recent times, we approach a variety of fads, some of which have a more sinister aspect. When men began to specialize to the extent to which they do today, they unconsciously became faddish. Faddism in its truest sense means seeing only one thing, and seeing it so hard that it shuts out the vision for other things. In its essence, it is nothing more or less than a certain species of narrowness; and a narrowness has crept into our profession in some of our ideas and our methods of practice which threatens to do much harm and which, in fact, has already resulted in incalculable damage to our patients.

In mentioning some of these practices and characterizing them as fads, I run the risk of bringing down on my head a combined chorus of protests from those who are so generally indulging in them today, but having thought long and earnestly on these things, and I am perfectly willing to accept the censure of a certain class of my fellow practitioners rather than sit idly by and see our patients imposed on as some of them are being imposed on today.

Take for instance the so-called surgical removal of teeth in which a section of the alveolar process is chiseled away, a flap made and a stitch taken in the gum after extraction. This method has been used in a percentage of cases out of all proportion to its legitimate practicability. The range of cases in which it is desirable is extremely limited, and the aggregate of damage done by this practice can never be estimated. Take the curettement of a socket after the extraction of a tooth as a routine practice that is advocated by some men, and try to estimate, if you can, the extent of harm done by this grotesquely absurd procedure. Strange indeed that, for centuries past—in fact ever since teeth have been extracted—and with the countless millions that have been taken out in that time, it has never occurred to our operators till just now that there was any necessity for curettement. Strange to contemplate the uniformity with which these myriads of cases have promptly healed in the past leaving no evidence that there was the slightest necessity for scraping and digging out the bone. An occasional and very rare case in which curettement may be indicated does not establish a rule for its employment in the hundred and one cases in which it is not indicated and its use will do infinitely more harm than good. If curettement is not a fad, it is something perilously akin to it—or it is something worse; and if the surgical removal of teeth is not a fad, it is something more to be deplored. If they are fads, they may consistently be classed not so much as fads conscientiously followed in all cases through conviction as fads followed for another purpose—they may be called fads for revenue only. This has no reference whatever to the removal of impacted teeth or to the occasional cases in which long continued neglect has resulted in such involvement of the bone as to call for surgical interference, but to the routine every-day case which forms the vast majority of all of those in which legitimate extraction is indicated.

And speaking of legitimate extraction brings up another subject that for the past few years, and even now, looms large on our professional horizon as one of the most outstanding fads of the century. In approaching this phase of our subject, I am conscious that I am quite likely to stir up a storm. To run counter to popular opinion on any question is to subject oneself not only to criticism but also, in some cases, to contumely; and yet it has been noted that, in many cases, popular opinion does not turn out to be permanent opinion—it is merely a wave that sweeps over the profession, only to disappear after it has run its delirious course. And when I speak of the present attitude of some men toward the pulpless tooth, I unqualifiedly term it a fad and a delirium. I have never known in all my professional experience so much damage to be done to so many people as in recent years through the needless and ill-advised extraction of teeth. If the undoubted benefit that has come from the removal of certain infected teeth were placed on one side of a balance, and the harm that has been done by the removal of teeth that should

have been retained, either with treatment or without it, were placed on the other, the harm would outweigh the benefit many times over. Of this, there is no possible question. In making this statement, I have just as vividly in mind the cases in which tooth extraction is indicated and necessary as I have the countless number of cases in which it is unwarranted and distinctly harmful. I have the firmest conviction that the time will come when the present attitude of a large element of the medical and dental professions toward the pulpless tooth will be looked on as a species of professional insanity—that it will be referred to in the future as one of the outstanding and disastrous fads of the century in medical and dental practice. Nowhere, in all the annals of medicine and dentistry, has there been such an apparent lack of balance on any question as there has been on this matter of the pulpless tooth, and in no line of professional effort has so much injustice and imposition been inflicted on the public as through this medium.

Day after day, we who are in general practice are confronted with the definite damage that is being done not only to the health and masticating efficiency of people, but also to their peace of mind. The pulpless tooth has been a prolific medium for frightening many people into a state of hysteria over the condition of their health. Every observant physician or dentist knows only too well the important factor of psychology in the incidence of disease. It is a very rare individual who cannot be frightened into an illness if the setting is just right, and by the same token many have been thus frightened in recent years over the pulpless tooth. If a person is not feeling quite up to the mark—probably has a touch of "spring fever" or has been violating all the laws of sane living, has forgotten that elimination is as important in the maintenance of health as is proper nutrition, and has consequently acquired a few aches and pains—a perfectly logical sequence of this kind of life—if this individual is told that a pulpless tooth in his mouth is pouring out poison in his system, it is not long before he can actually feel that poison coursing rampantly through his veins. It matters not that he has been carrying that pulpless tooth serviceably and comfortably for years through the most robust health, and—even more significant than this—through periods of similar illnesses from which he has recovered perfectly and still retained the tooth: it matters not that there are other and logical reasons why he should not feel well—the virus of fear has entered his consciousness and he is not comfortable till the tooth is removed. No wonder he feels better the moment it is out; no wonder there are so many miraculous cures following the extraction of teeth. To watch the psychologic play that is going on today over this matter of pulpless teeth forces the old time reflection of Puck, "What fools these mortals be." And the aggregate of harm that has been done to the people through these processes can never be computed.

I do not need to go into the tragical farce of roentgen-ray interpretation as it applies to this question at this time, except to state that we are under deep obligation to some of our sane and conservative roentgenographers for the elimination from their diagnostic charts of such terms as "abscess," "infection," "pus pockets," etc., which a few years ago adorned nearly every roentgenogram of the teeth, and which added their full quota to the general demoralization of judgment regarding the pulpless tooth.

In referring to the present prejudice against the pulpless tooth as a fad, it is needless to state that I do not argue for

the retention of an infected tooth in the mouth. If a tooth cannot be cured of its infection, it should come out; but my present emphatic contention is that every pulpless tooth is not an infected tooth, and that many infected teeth can be freed of infection by treatment. I do not at all subscribe to the dogma that a tooth once infected is always infected; nor do I believe that one-half the ailments which today are attributed to pulpless teeth are due to them at all.

I freely, frankly and humbly admit that I am not a research worker in a pathologic laboratory, but I have had a somewhat extended clinical experience reaching over many years, and I have not gone through my professional life with my eyes closed. I am aware that it is today the greatest heresy to state that clinical observation is as valuable in forming a judgment on these matters as is laboratory experimentation, and yet the more I see of the practical application of theories formed by experimentation, and of those formed by clinical experience, the more I am impressed with the limitation of the laboratory method as carried out by many of our investigators, and with the value of long-continued practical experience. And I am thoroughly convinced that, in our present prejudice against pulpless teeth, we have gone far astray, and I hereby make the strongest possible plea for a return to conservatism and sanity. We should no longer deprive people of useful organs without justification, and we should abstain from needlessly frightening people about their physical condition when there is no warrant for this fear.

As the years go on, we shall get nearer the truth concerning these things, and my present prediction is that we shall arrive at the truth more surely by careful clinical observation and study than through the medium of laboratory research. Valuable as laboratory research is it can never quite encompass the intricacies of the life forces, nor can it reckon with the psychologic factors that enter so vitally into the problem of treating disease and keeping people well.

# FUNDAMENTALS SUGGESTED BY RECENT RESEARCHES FOR DIAGNOSIS, PROGNOSIS, AND TREATMENT OF DENTAL FOCAL INFECTIONS

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THE new light that has been thrown on dental infections and their relation to health and disease as a result of recent researches in many laboratories, including our own, has demonstrated the dire need for a revision of the fundamentals for diagnosis, prognosis, treatment and prevention of dental infections. This paper will present additional data; and because of the lack of time and the great bulk of new data, it will be necessary that they be abbreviated in the presentation of details. I shall endeavor in the time allotted to present new information on the following important phases of the dental infection problem: 1. Limitations of the roentgen ray. 2. Bacterial accommodation. 3. Grouping of individuals upon a basis of dental pathologic conditions. 4. Grouping of individuals upon a basis of presence or absence of streptococcal susceptibility. 5. Chemical changes in the blood. 6. Calcium metabolism. 7. Relationship of type of degenerative disease to type of bone reaction.

In order to orient ourselves, let us review the present situation. The current belief and basis of practice is, in my judgment, about as follows: That the roentgen ray will reveal the presence or absence of dental infection because dental infections produce changes in the supporting structures about an infected tooth in the form of a zone or chamber about the apex of the tooth. This absorption is, in volume, in direct proportion to the amount of infection present, and therefore the danger to the individual is expressed quantitatively by the extent of the zone rarefaction. The precise measure of this extent is believed to be revealed by roentgenograms. I shall present further evidence, which I find myself unable to interpret in any other way than as contradicting the validity of much of the foregoing premise and as indicating an entirely new basis for judgment.

In my recently published text,[1] I furnished a quantity of evidence which I shall assume that my readers are, in general, familiar with. I have shown, for example, that the presence of an extended zone of pus in the joints and muscles of the limbs of a rabbit is not revealed by the roentgenogram, and have presented much other data to demonstrate that dental infections may be present without being revealed.

In Figure 1, there will be seen the two central incisors of each of four individuals. One central incisor in each case is putrescent, with little or no indication roentgenographically of either the identity of the tooth or the extent of the infection. Three of these individuals are seriously ill and one gravely so, with

1. Price, W. A.: I Dental Infections, Oral and Systemic; II, Dental Infections and the Degenerative Diseases. Cleveland. Penton Publishing Company, 1924.

heart involvement. This raises the question at once: Are we correct in the premise as previously stated; and, if not, why not?

As a further introduction to the consideration of this problem, in Figure 2 we have a comparison of the apparent and actual appearance of a practical case in which, in *A* and *B*, above, will be seen the roentgenographic appearance of the first and second molars. In *A* there is distinct roentgenographic evidence of periapical radiolucence, which is but slightly, if at all, evident about the roots of *B*, the second molar; and, in *A* and *B*, below, we see that the granulomas on these roots are larger on *B* than *A*. Why has not the roentgenogram told us the whole truth? (There is no question that it tells the truth.) Is it not because we do not understand its message?

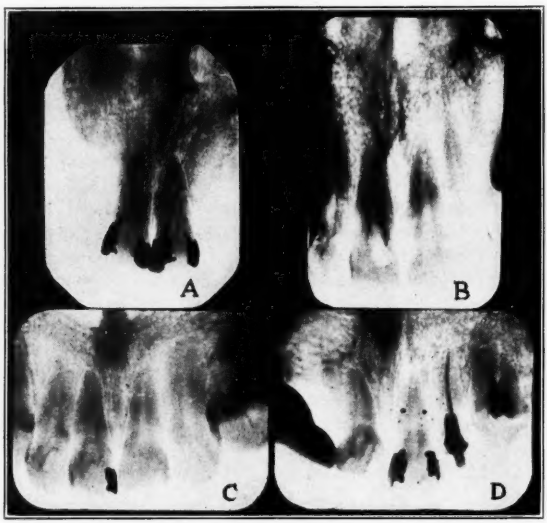


Fig. 1.—Four pairs of incisors. One of each pair is putrescent. Three of the patients were seriously ill. The true condition is not revealed.

In order to determine the explanation for this phenomenon, I have made a series of determinations, some of which are as follows: By taking a piece of beef bone, and for this the sternum (the butchers refer to it as the brisket bone) was particularly well suited because it has a considerable portion of spongy bone in proportion to dense, and by cutting it in half and then placing a metal bar, approximately one-fourth inch square but with teeth on one side, between the two pieces, and placing these pieces in a vise and forcing the metal into the spongy bone, an indentation is made the size of the metal bar. This metal bar is shown roentgenographically in position in Figure 3*A*. In Figure 3*B*, we see the photographic appearance of these two indentations, and it will readily be observed that the teeth have registered their imprints in detail in the half in which they were embedded, while the opposite surface is relatively smooth. In *C* we have the roentgenographic appearance of these two pieces put in juxtaposition, and several impor-

tant things are at once discernible. The bone looks entirely different on the side to the left where the metal bar had teeth, but since the tooth prints are in alinement, there is a shading of the density, which, if we did not know what had caused it, would not be suggestive. On the other, or right hand side, where the metal bar was smooth and flat, the hole has a clear-cut limited margin, but the bone below it or beside it is more dense than the surrounding bone, because of its condensation. In *D*, we have rotated the two pieces approximately 10 degrees, and the line that separated the two pieces in the middle of the chamber now appears to be to one side of the chamber, and the chamber instead of appearing to be square with a diffused margin at one side where the teeth made their impressions is now oblong and would give one the impression of being only a fraction of the size that it appears in *C*, while it is actually the same. In *E*, we have the roentgenographic appearance at 20 degrees from *C*, and the margins are lost and the chamber is indistinct. In *F*, we have a view at 30 degrees, and the chamber is nearly lost, as also at 60 degrees in *G*. In *H*, we see it at 90 degrees, and the chamber does not show, although there is a faint suggestion of the tooth prints. In *I*, we have the roentgenographic appearance of the two halves laid side by side and corresponding with *B* in position; and it will be noted that while the bone was compressed in each half about the same amount, the final distribution of material due to displacement is a little different on account of the tapering shape of the teeth; and the half of the bone, which received the plain surface of metal, shows practically no impression or record of the chamber, shown photographically in the lower part of *B*. The bent wires show the approximate angles.

What I am desiring to demonstrate here is the effect of a zone of condensation when it occurs in the same path as an area of rarefaction. This is quite clearly demonstrated in Figure 4. In this case, a square-ended punch was driven into the bone, as shown in *A*, and the bone was then roentgenographed without the tool in position in *B*, in the same direction in which the presence of the chamber is but slightly recorded, and in *C*, at right angles to the chamber which not only shows the chamber distinctly but the condensed bone, which was nearly equivalent in total absorption quality to the same bone before the tool was driven.

Fig. 2.—First and second lower molars shown in *A* and *B*, above, and their roots, with granulomas, after extraction, as shown in *A* and *B*, below. The granulomas are larger on the second molar than on the first molar, though their presence is not revealed roentgenographically.

We have here a duplicate of the physical condition that is found in dental practice, though it is produced by a different process. In Nature, the zone of condensation around the chamber of rare-

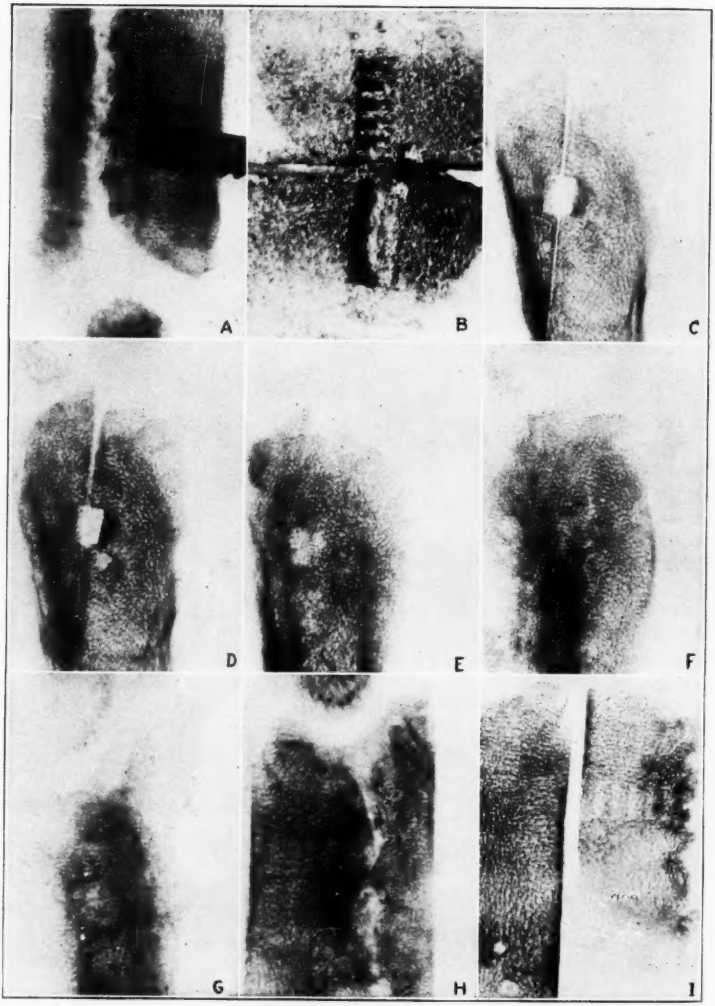


Fig. 3.—Chamber in bone at different angles: *A*, as made by a metal bar, producing a chamber one-fourth by one-fourth by one-half inch; *B*, appearance of chambers in separated bones; *C*, appearance with rays in line with the long axis of the chamber; *D* (10 degrees), *E* (20 degrees), *F* (30 degrees), *G* (60 degrees), and *H* (90 degrees) at different angles; *I* (90 degrees), the two pieces separated and roentgenographed at right angles to the long axis of the chamber. The bent wires indicate the angles. There is practically complete disappearance of this large chamber.

faction is produced as part of the reaction process, and, when superimposed above the zone of rarefaction, more or less completely disguises or obliterates its presence. We shall discuss later when and why Nature builds this type of bone.

By using a section of rib, we have more nearly the relative amount of spongy and dense bone that will be found in the mandible. In Figure 5, there will be seen two tests using sections of ribs. In *A1,* the tool, which is a cold chisel, has been driven through the section of bone in the direction of the long axis of the rib; and, while most of the material has been moved laterally, there is shown roentgenographically, in *A2,* a distinct outline of the chamber, which is about five-sixteenths by seven-sixteenths inch. In *A3,* we have the roentgenographic appearance when this chamber is viewed from the side; and is it not disquieting that there is relatively so little evidence as to its exact size? This is also illustrated in *B1, B2* and *B3* of the same figure. In *B1,* we have a screwdriver driven into a section of bone. In *B2,* we have the roentgenographic appearance in the direction that the screwdriver was driven, and, in *B3,* the relatively slight record of the presence of this chamber.

That this is just what is happening when teeth are roentgenographed for evidence of infection is abundantly demonstrated by the clinical findings. In Figure 6 will be seen the photographic appearance alongside the roentgenographic appearance of a number of extracted teeth in cases in which the granuloma remained attached to the root and by its presence could demonstrate the size and shape of the chamber from which it had been removed. The men who have been doing surgical work in these conditions are all familiar with the frequency with which they find the physical condition very different from that suggested by the roentgenogram. Since we are studying here only the question of the limitations of the roentgen ray, I am not justified, because of the large number of problems we wish to cover, in taking more time for this particular phase.

I find great difficulty in selecting typical cases to illustrate the tragic mistakes that are being made because of confi-

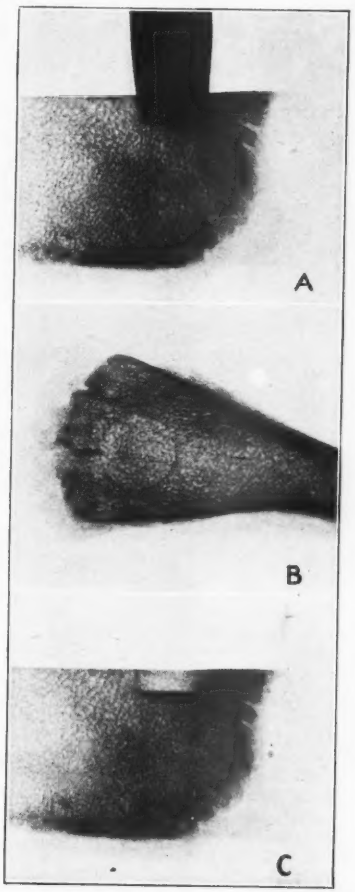


Fig. 4.—Limitations of roentgen-ray to disclose chamber in bone: *A*, square end punch in position; *B*, perpendicular roentgenographic appearance of chamber; *C*, right angle appearance of chamber. A zone of condensed bone obstructs the view in *B*.

dence in the old, and what I believe to be mistaken, basis of judgment as to what constitutes evidence of dental infection. I see many cases that would splendidly illustrate this situation. A recent case is presented herewith.

REPORT OF CASE

A woman physician, aged 65, had had removed three teeth that I had condemned in May, a diagnosis for which there did not at the time seem to her, to be justification either from the clinical symptoms or from the roentgenograms. The teeth had just previously been roentgenographed and the film interpreted by the dentist to whom her physician had sent her. When the teeth were extracted, she had a feeling that the evidence, on the basis of her training, had not justified their removal; but she had consented, because of the seriousness of her condition; and she wished now to apologize for her lack of confidence that the removal might be helpful, because of the great improvement that has been occasioned.

Her history briefly is this: She was operated on in 1917 for duodenal ulcer, for which a gastro-enterostomy was performed, and she had relief for seven years. The trouble returned with marked severity last January, and she had lost approximately 1 pound a week, going to the lowest weight since childhood, with much distress in the duodenal region. With the removal of the three teeth, shown in Figure 7 (marked x), she experienced a rapid improvement, with complete relief of the local symptoms and a return to normal weight and health in a short time. She states that she has no doubt that the removal of the teeth in question was the important factor in bringing about the change. Her physician interpreted her eosinophilia of 10 per cent as indicating an infection process. After the removal of the teeth, this was reduced to 2 per cent.

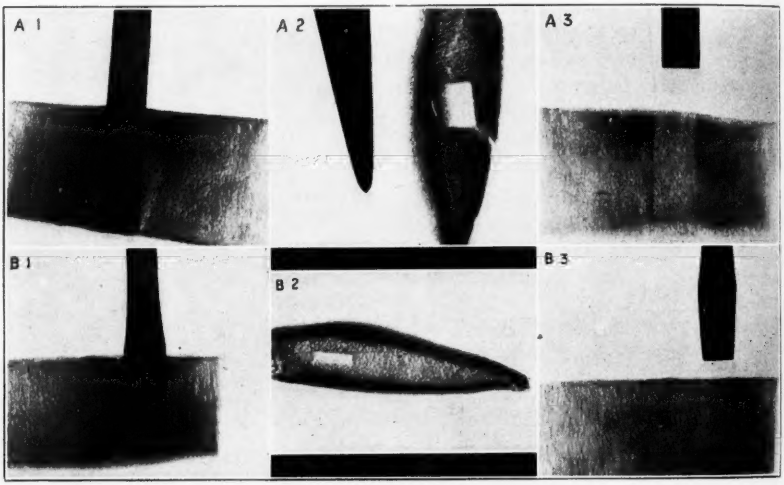


Fig. 5.—Studies of chamber in bone: *A-1*, chisel driven through section of rib; *A-2*, chisel, side view, and chamber, end view; *A-3*, right angle view of same chamber; *B-1*, screwdriver driven into section of rib; *B-2*, chamber, end view; *B-3*, chamber, at right angles.

By review of the roentgenograms, (Fig. 7), it will be noted that the upper right first and second bicuspids carried root-fillings, but were, on the basis of usual methods of interpretation, so-called roentgen-ray negative. The upper left first molar, which appears to be normal roentgenographically, did not respond normally to temperature and electric current, and contained a degenerating pulp. It, probably, with its three roots and pulp infection furnished more

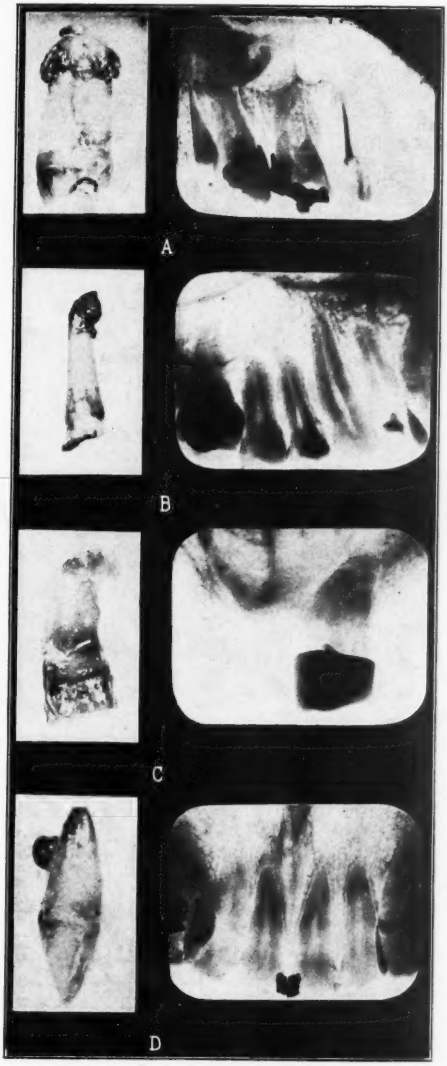


Fig. 6.—Comparison of roentgenographic appearances with the actual, as revealed by photographs of extracted teeth with granulomas. The absence of roentgenographic evidence of periapical involvement may be noted.

infection and toxic material than the two root-filled teeth. When cultured, it gave no growth in nine days aerobically, but grew a culture next day after covering with petrolatum.

This case illustrates not only the inadequacy of our accepted standards for roentgen-ray interpretation but also, splendidly, the presence of an eosinophilia in an individual with normally a high defense, carrying a chronic focal infection for a considerable time, during which the resistance has gone down. This type of person we find making up the group of individuals who develop sensitization reactions from the antigen from infected teeth. The evidence is accumulating that stomach and peptic ulcers are, in many cases, in part sensitization reactions.

### BACTERIAL ACCOMMODATION TO AVAILABLE SOIL

We have thought of the type or strain of organism as being the chief and the determining factor in infection. We now have evidence that the soil is the most important factor. In other words, our chief attention is being changed from the biologic qualities of the organism to the biologic qualities of the host. I have previously presented data indicating that, when organisms are submitted to increasing strengths of various drugs, they develop a state of tolerance; for example, a strain of streptococcus, which required a dilution of 1:10,000 of liquor formaldehydi for growth came finally by successive stages and transfers to grow in a concentration of 1:320, approximately thirty times the original concentration. Likewise, the organisms changed their tolerance for alcohol through a range from 1:400 to 1:20; phenol, from 1:25,600 to 1:800; thalium sulphate, from 1:3,200 to 1:200. We have repeated these tests, applying them to several additional drugs, now sold for that purpose, and to date have found no exception to what seems to be a constant biologic quality of these strains of streptococci tending to develop a condition of endurance or tolerance for concentrations that formerly not only inhibited their growth but also actually devitalized them. These reports will be made later.

This quality of adaptability is not restricted to organisms of the streptococcus group. It has been shown, for example, that *Treponema pallidum*, when growing in the body, can acquire a state of toleration for the arsenic compounds, such as arsphenamin, if too small doses are used at first. The very principle of therapeutic procedures in infected pulpless teeth presupposes not only that the infected tooth can be sterilized but that

Fig. 7.—Three infected teeth, two root-filled (at right), one molar not root-filled but putrescent (first molar at left), apparently seriously injuring the patient.

a condition of intolerance for organisms can be maintained. That this state of intolerance is not readily established was early demonstrated to my satisfaction by the following test. I invested the teeth in plaster of Paris, and autoclaved the blocks containing the teeth and sent them to a series of dentists for placing of root-fillings by their methods. They did not have to sterilize the teeth for there was no question that they were sterile and free from living organisms. When the teeth were received, they were placed with their root-fillings in infected culture mediums. In two weeks, cultures were made from different parts of the teeth, and it was found that the majority of these teeth were already infected in the dentin and several grew cultures from sections of the root-filling material that

had been placed not only in a presumably sterile manner but also in teeth that had been saturated in medicaments to the liking of the operator. This also suggests why it is that such a large proportion of extracted pulpless teeth show infection when they are cultured in suitable mediums with suitable gradations of oxygen tension.

In my recent text, I have shown that when iodoform is saturated in alcohol and the alcoholic saturated solution is added to the culture medium, the organisms will grow in a 1:80 dilution of the saturated solution of iodoform and alcohol at the beginning of the test and that they grew finally in a 1:10 dilution. This seems to explain why it is that when teeth that have had their pulp canals packed with iodoform preparations in such great concentration are opened years afterwards, the odor of the iodoform will penetrate the room, and streptococci can frequently be grown from this iodoform paste.

In this connection, it is of interest to note that the biologic differentiating characteristics of organisms that are expressed in sugar fermentations are changed by these processes. In other words, we have found that organisms can be changed from a classification such as *S. salivarius* to a classification such as *S. mitis* and later to *S. faecalis.* It now seems probable that the environment in the different parts of the tooth and in different teeth of different individuals may change the ordinary mouth strains, usually found as *S. salivarius,* and relatively harmless with regard to disease-producing qualities, to other strains, such as *S. mitis* and *S. faecalis;* and indeed there is reason to believe that even the quality or extent and type of hemolysis can likewise be changed. In other words, the viridans or green-producing group seem now to have had their characteristic qualities, which have given them that classification, established by the fact that they have grown in the presence of charged oxygen and carbon dioxid tension, and changed serum proteins; in other words, the accumulating evidence compels the serious consideration, if not acceptance, of the belief that the host determines largely the biologic qualities of the organisms growing in infected teeth. An important additional light will be thrown on this theory by a consideration of the difference in systemic susceptibility of different individuals.

### DIFFERENCES IN TYPE OF LOCAL REACTION AS A BASIS FOR CLASSIFICATION OF INDIVIDUALS

Another of our accepted fundamentals presupposes that an infection, if present in a tooth, will produce a destruction of bone about its root apex, which of necessity must appear as a zone of radiolucence. This assumes that individuals will behave similarly in the presence of an infection or rather as a result of the presence of an infected tooth structure within their tissues. I previously presented extended detailed evidence indicating that individuals do not react similarly, as regards the supporting structures, to a given dental infection. Our further detailed studies add much evidence that, in general, individuals do not present similar reactions but that they can be divided into three main groups on the basis of the type of reaction or tissue change produced in the supporting structures by a given dental infection. I probably should repeat frequently the words "given dental infection," for I am continually misunderstood because people apparently do not understand what I mean by a given dental infection. If a single-rooted tooth has a putrescent pulp, it presumably has more infection with both the capacity of the pulp chamber and dentin available than it would with the dentinal tubuli alone. Similarly, a molar has more capacity for holding infection than a lateral, assuming each to have a putrescent pulp. In the presence of a given dental infection, some indi-

viduals will produce a very large zone, some a large zone of radiolucence surrounded by a zone of radiopacity, and others very slight evidence of rarefaction at the apex, with or without considerable evidence of increased density; the alveolar bone about it. There is all the infection of a putrescent pulp. You will note particularly the absence of a zone of condensation about this zone of rarefaction. You will also note that there is distinct evidence of absorption of the

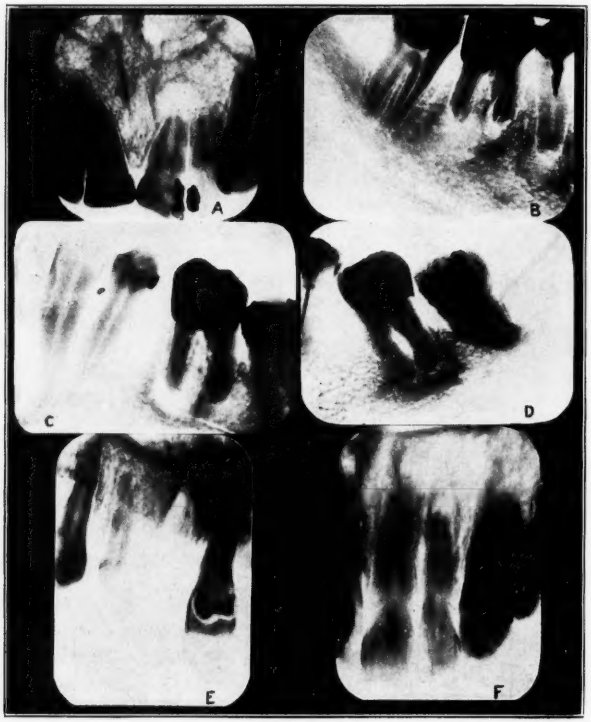


Fig. 8.—Six cases representing three distinct types: *A* and *B*, extensive apical decalcifications with root end absorptions, in individuals with a high defense and susceptibility group absent; *C* and *D*, individuals with condensations surrounding zones of rarefaction, acquired susceptibility group; *E* and *F*, teeth with slight apical absorption with tendency to condensation, in sick patients, inherited susceptibility group.

and a given dental infection may produce changes within this wide range in different individuals.

In Figure 8, we have six teeth, two of which represent one of three types. In *A*, we have a central incisor with an extensive zone of absorption of root substance itself. In *B*, we have a similar condition about the molar. In this type, on surgically opening the bone tissue, it is found that there is a marked tendency for the organized tissue that occupies this space to be in direct contact with the medulla of the bone. The

trabeculi tend to be relatively small and the intratrabecular spaces relatively large. *A* and *B* are typical of Group I.

In *C*, we have a molar that shows a marked zone of radiopacity about a large zone of radiolucence. The zone of dense bone tends to shut off quite completely the direct communication between the organized granulomatous tissue and the medulla. In *D*, we see a

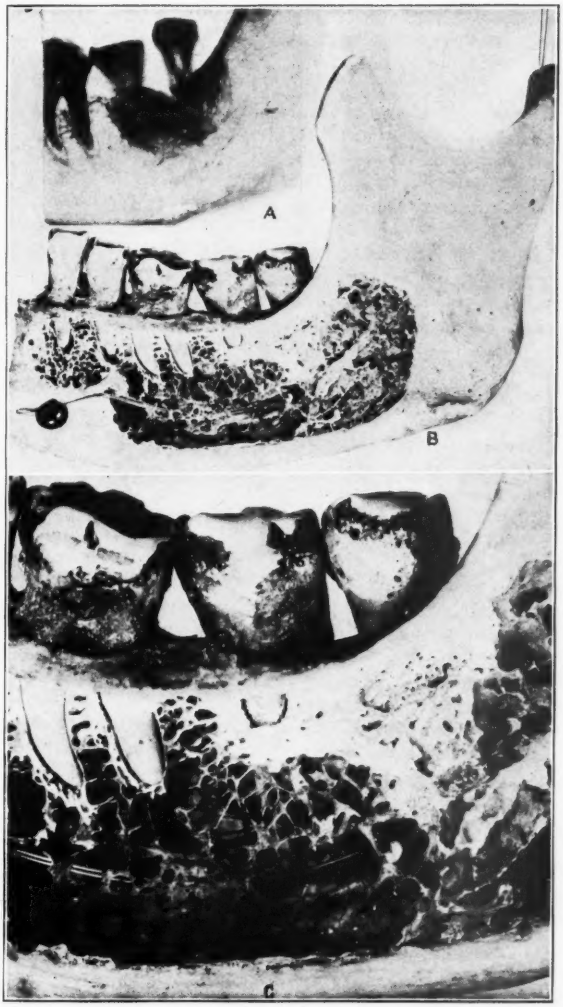


Fig. 9.—Condensed bone produced by long continued food pack between the second and third molars. The normal spaces between the trabeculi are obliterated.

similar condition, though more marked. *C* and *D* are typical of Group II.

In *E* and *F*, we have the quantity of infection of putrescent pulps and laterals, and in each case relatively a much smaller zone of radiolucence; particularly in *E*, it will be noticed that the intratrabecular spaces are smaller than in *A*. *E* and *F* are typical of the third group so far as they show the small zones, though in many cases we find more condensation than is shown here. These are both in young people, however. It is strange that phenomena that are so far-reaching in importance have received so little attention when such a vast throng has been in such close contact with this problem. This is probably largely due to the fact that we do not see the bone tissue free from its included organized or disorganized softer structures.

In Figure 9 will be seen, in the roentgenogram *A* and in the section *B*, the difference between the normal porous bone structure and the condensed bone resulting from long continued chronic irritation, in this case from a food pack between the second and third molars. *A* shows the roentgenographic appearance of this dense area. *B* and *C* show the photographic appearance of these structures, and it will be noted that the intratrabecular spaces in the vicinity of the irritation have been quite completely filled in, in such a manner as to make the bone practically continuous. In passing, this is the principal reason for the so-called dry socket, for this tissue with its poor vascularization and its frequent inherent infection has both poor repairing power and an internal infection, which bring about quite serious interference with the healing process.

### DEGREE OF SUSCEPTIBILITY TO RHEUMATIC GROUP DISEASES AS A BASIS FOR GROUPING INDIVIDUALS

The diagnosis, prognosis and treatment of dental infections, as almost universally conceived and practiced, have, as the fundamental tenet, that various individuals are comparable to one another because they will, in the presence of similar infections, react with uniformity and similarly. Internists and surgeons have long observed that many individuals are found who, notwithstanding extensive dental infections, are in excellent health and give a history of always having been so. Several years ago, I began recording evidences of a familial aspect both for the type of systemic involvements that tended to develop and for the type of dental pathologic process that tended to exist in such individuals, classifying in detail the family characteristics in cases in which individuals suffered from acute and chronic infections associated with dental lesions. These data are now very extensive, including a study of more than 1,500 families, in which the individual in question, his or her brothers and sisters, the father and mother, the brothers and sisters of, each, the father and mother, and the four grandparents have all been considered. These studies have shown, as I have reported in detail, that individuals may be divided into three main groups on the basis of the presence or absence of a susceptibility to the rheumatic group diseases. These groups are, first, those with an absence of susceptibility, which has characterized the past and present of the individual and in general the members of the family; second, those with an acquired susceptibility; these, in the main, having been free from rheumatic group disturbances but having recently developed them under physical overload; and, third, those who have frequently been affected as have the members of their families. This is readily demonstrated by such analysis of the extensive data as the following:

Ten individuals were selected (and on the foregoing basis there is an average of approximately sixteen members for each of their families) having each of the following affections: rheumatism or arthritis, heart involvement, break in the nervous system, lesions of internal

organs. This study is made to compare the number of lesions in the various members of these families with those of the members of each of the other groups. This study shows that in the group of ten families, or approximately 160 individuals, when the patient's chief lesion was rheumatism or arthritis, there were fifty-nine suffering from this affection; whereas, in the other three groups, the number affected with this type of lesion was twenty-four, fifteen and thirteen, respectively. In the group with heart involvement, the figures are fifty-seven as compared with seven, nine and nine; in the nervous affections, 142 as compared with nineteen, twenty-five and thirty; and in lesions of an internal organ, ninety as compared with nineteen, thirteen and twenty-eight. As important as this observation is, it has a vastly enlarged interest and use in the light of the next important discovery, which was that individuals, when grouped on the basis of the type of dental pathologic condition and the presence or absence of susceptibility, tend to have the same individuals in unit groups, for it proves to be the case that those individuals who have the large zones of rarefaction, as illustrated in Figure 8, *A* and *B*, are the individuals in the group with the absence of rheumatic group susceptibility. By rheumatic group, we mean lesions of joints, muscles, hearts, kidneys, nervous system, etc., which tend largely to develop in susceptible tissues or to be aggravated by streptococcal focal infections. The accumulating data make the mass of evidence so overwhelming that there seems no other possible way to account for the close association between the type of dental pathologic condition and the type of systemic reaction.

Referring to the individuals whose teeth are shown in Figure 8, *A* represents an individual and family in whom the examination shows there was a total of four rheumatic group lesions. In my recently published data, I have shown that, in this group, the number of severe and mild lesions range from two to seven instances of attack for all tissues and for all members of the family in the different figures representing groups, the members of which are more or less strikingly characterized by an absence of susceptibility. Another characteristic of this group is also shown in *A* in the absorption of the apex of the root to which I have previously referred, and which is also shown in *B* on both roots of the molar and the root of the bicuspid.

*B* also shows an extensive zone of rarefaction and, as stated, is a typical illustration of the individuals of this group. A study of the family and of this individual shows that, in the patient and all the various members of the family, there have been only two instances of rheumatic group lesions. Neither of these two patients have ever suffered from any of the rheumatic group lesions. *A* had a sensitization disturbance, which was completely relieved by the elimination of a dental infection. We will refer to this characteristic of this group presently.

In *C* and *D*, we have illustrations from two individuals who represent the second group; namely, the one with the acquired susceptibility, and, on the basis of dental pathology, the group having large zones of rarefaction surrounded by definite zones of condensation around the zone of decalcification. When we make a study of the patients represented and the members of their families, we find that the individual whose teeth are shown in *C*, aged 32, had splendid health until recently but suffered from neuritis and sense of weakness. Four years ago, she had been overwhelmed with a series of illnesses, including malaria, smallpox and pneumonia, followed by tuberculosis, all occurring while she was carrying this and other infected teeth. A study of her case shows that there are, in all, seventeen cases of acute involvement of the rheumatic group recorded in the family. I shall refer later to the significance of an important factor here in the discussion of tuberculosis and dental infections.

The individual represented in *D*, aged 50, had acute digestive involvement with symptoms of ulcer and neck involvement. Her health had been good until the last few years, when the acute digestive disturbance began. Incidentally, it is four years since her teeth were removed, and she has had complete and continued relief from the distressing distention and pain in her stomach. When we make a study of the patient and the other members of the family, we find seventeen instances of rheumatic group lesions. This woman represents a great many of the individuals that make up a modern civilized community where the epidemic infectious diseases are under control, and people are now spared to develop the degenerative diseases. She had a sister suffering from severe stomach trouble. There is therefore this much suggestion of a family weakness in that tissue.

In *E* and *F*, we have roentgenograms showing the type of dental pathologic condition that is likely to be met with in those individuals who have not had an adequately high capacity for reaction against even a severe dental infection. In each of these cases, we have a putrescent pulp in a lateral incisor, and yet it will be seen that there is relatively little structural change revealed roentgenographically compared with the total large amount of infecting material.

*E* is taken from the case of a boy, aged 16, bedridden for years with deforming arthritis and so incapacitated that he could scarcely

move his hands or feet. He had been crying by the hour for months when I was called to the hospital. The multiple proliferative arthritis was so severe in practically every joint of his body that he was almost helpless, and we had to use force even to open his ankylosed jaw one-sixteenth inch to permit films to be placed in edgewise for making roentgenographic studies of his teeth. The very slight structural changes about the teeth in this patient should be noted particularly, none of which were sore or gave local discomfort. This, as we now know, is because of a lack of capacity for active reaction close to the source of infection. Photographs of this boy illustrate better than any words can the change in his life. In Figure 10, he will be seen lying in the hospital bed with his hands and feet so swollen and painful that his mother stated to me that she would be the happiest mother in the world if she could see her boy die to cease his suffering, which had been going on almost continuously since he was 12 years old. With the removal of these apparently roentgen-ray negative but definitely infected teeth, his improvement was remarkable and rapid. It was apparently assisted by the use of a vaccine. This was six years ago, and except for a recurrence of his trouble, which was again relieved by the removal of a newly infected tooth, when he returned to the city, he has been progressively improving since. Within a few months, the mandible, as well as his hands, had regained nearly normal movements, and he now does most beautiful carving. In Figure 11, he will be seen as he appears in a recent picture.

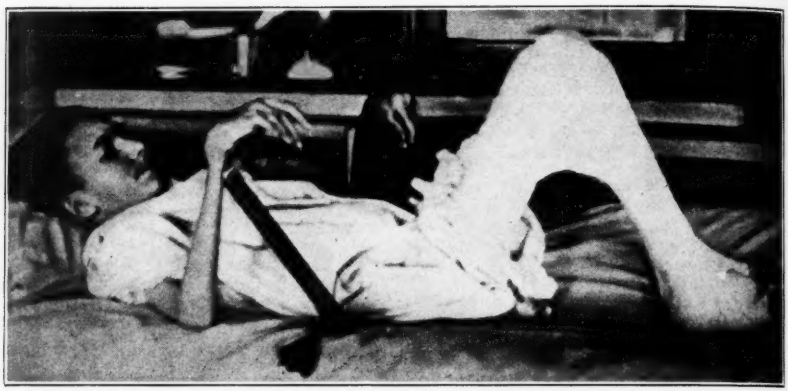

Fig. 10.—Boy suffering and bedridden for years from arthritis, whose tooth is shown in *E* of Figure 8. He has marked hereditary susceptibility.

From the standpoint of this present discussion, it is of interest to note that his father died at 57, having suffered severely with rheumatism, and his father's brother died with deforming arthritis. His mother's father suffered severely with arthritis, as did also his mother's brother. We find in the study of this case thirty instances of breaks with rheumatic group diseases. This boy is just one of the many that have had the misfortune to be born from a parentage that did not have a normal and adequate defense against strep-

Fig. 11.—Appearance, a few months later, of boy shown in Figure 10. Many joints stiffened for years have limbered up. Relief from pain is complete. The airplane and carvings were made by his hands, previously helpless for years.

tococcal infection and did have a very severe susceptibility to dental caries, which is so often characteristic of the individuals of this group.

In *F*, (Fig. 8) we have a lateral tooth of a young lady, aged 23, incapacitated from work with rheumatism and heart involvement. The slight reaction about a large area of infection, such as obtains in a tooth with a putrescent pulp, may be noted. The patient was very much underweight. With removal of her teeth, she gained 22 pounds, and in six years, she has had no return of rheumatism and heart trouble. In her family, we find that two brothers, three sisters, father, father's mother, father's sister, mother, and mother's mother, all (eleven), suffered from rheumatism, and eight suffered from heart trouble, with which four have died. In other words, in this family, we have thirty-eight breaks as rheumatic group diseases. The patient was doomed before she was born. Her mother died at 50 with acute heart involvement; her father's mother at 31, of acute heart involvement; her father at 55, of acute heart involvement.

Individuals apparently are not similar and our duty clearly is not to judge them all by the same standards with regard to their factors of safety but to adapt the load to each as conditions may justify.

## CHEMICAL CHANGES IN THE BLOOD, UNDERLYING DEFENSE AND SUSCEPTIBILITY

On account of the largeness of the subject in proportion to the time available, we must pass over with but a word, the important finding, as previously published, that dental caries develops directly in proportion to our susceptibility to breaks in the form of rheumatic group diseases; which has tremendous significance since it means the direct exposure of all those individuals to a source of streptococcal infection who would probably be seriously injured by it, if such did exist as a focal infection. We must also pass over our findings that a tendency to periodontoclasia not only parallels the capacity for making a large chamber at the apices of teeth having dental infections but also develops in inverse ratio to the susceptibility to caries and in proportion to the existence of an adequate and high defense against rheumatic group disturbances. This throws tremendous light on the etiology of these diseases, but does not justify the claims of those who interpret periodontoclasia to be purely a systemic problem; for, just as periapical involvements do not develop except in the presence of an adequate irritant, in that case the infection within the pulp chamber, just so gingival reactions of a similar type do not of necessity develop except in the presence of adequate irritants, which take many forms, such as food packs, gingival deposits and, perhaps more important than either, bacterial invasion, all of which are subject to influence and in many cases to control. I am purposely inviting discussion at this point.

I have previously noted that generally patients with diabetes have, in its early stages, both high total calcium and a high ionic calcium. It is of particular interest to us also that the carbohydrate metabolism seems directly associated with the etiology of periodontoclasia, or so-called pyorrhea, and there is much evidence that one of the factors involved is a vicious cycle in which the gingival infection plays an important part. Some authorities give as the threshold of danger of blood sugar 120 mg. per hundred cubic centimeters, of resting blood; for there will usually be found several milligrams difference before and after breakfast. Evidence of the influence of dental infections on the blood sugar level will be illustrated in the following cases.

The first is one of severe diabetes, sufficiently grave that the patient has been receiving insulin three times a day. By its constant use, the urine has been kept free and the blood sugar has been kept down to 208 mg. After the removal of the pyorrhetic teeth, the blood sugar dropped to 153, which was more than half of the total pathologic sugar, with marked improvement in the patient's general feeling. In this case, there were seven teeth extracted. It is important to note that, in these diabetic

cases, we are always dealing with poor surgical risks; and since epinephrin lowers carbohydrate metabolism, it should be reduced or eliminated from the local anesthetic. This is exceedingly important.

Another typical and illustrative case is the following:

> The patient's chief trouble was neuritis and digestive disturbance, associated with which, as an apparently contributing factor, he had ten infected teeth, without marked tendency to periodontoclasia. The blood sugar was 125 before the removal of the teeth, and fell to 91 thereafter. He also had complete relief from the neuritis and digestive disturbance. A letter just received from him states that he has gained in weight, and is now able to eat fruit, which he had not been able to eat before for more than a year.

Patients with diabetes develop, as part of the group of symptoms, a distinct acidosis, and it is particularly of interest to us that many of the patients presenting chronic dental infections have, as a part of the blood picture, a marked reduction in the alkalinity index. In the first of the two cases just cited the patient had an alkalinity index of 29.08, about 45 being normal. This is one of the most important factors involved in surgical shock and is one of the principal reasons why diabetic patients have such severe physical reactions following surgical procedures of all kinds, including extractions.

Since the normal hydrogen-ion concentration of the blood is distinctly on the alkaline side of neutrality, a $p_H$ of 7 being neutral and normal blood being from 7.34 to 7.4, we have by this means an important index as to the danger of shock reaction following surgical procedure. As the $p_H$, or hydrogen-ion concentration of the blood, tends largely to be paralleled by the alkalinity index in the early stages of physical disturbances or as the result of acute processes, either or both of these factors give a direct indication of the factor of safety of the patient. While it is true that, in many diseased conditions, there is a compensated acidosis, in which condition the patient's body adjusts itself to a new level, we find a quite remarkable parallelism between the hydrogen-ion determination of the blood made by a potentiometer method and the alkalinity index, as is shown in Table 1. In this group, it will be seen that when the hydrogen-ion concentrations are arranged in a progressive order from 7.1 to 7.4, the alkalinity index of the blood made at the same time shows parallel depression, ranging from 25.7 to 46.46.

TABLE 1.—RELATION OF HYDROGEN ION TO ALKALINITY INDEX

| Case | PH | Alkalinity Index |
|---|---|---|
| 1008 | 7.12 | 25.70 |
| 1489 | 7.11 | 26.52 |
| 1495 | 7.12 | 29.08 |
| 1501 | 7.21 | 31.24 |
| 1491 | 7.28 | 31.08 |
| 1500 | 7.29 | 34.04 |
| 1508 | 7.32 | 38.04 |
| 1433 | 7.37 | 46.46 |
| 1503 | 7.41 | 40.30 |

It must be remembered that the science of blood chemistry is still in its infancy, and while much has been determined, there remains very much to be determined. In dental problems, we are concerned intimately with calcium metabolism and, it is of utmost importance that new light be thrown on this phase of our problems as rapidly as possible. Unfortunately, this work is exceedingly difficult and complicated and but few individuals have been trained for this field. It is unfortunate, indeed, that we have now no institution in a position to concentrate on this special dental problem, or probably we should say "this problem that is of special interest to the dental profession." Large quantities of material are always necessary before deductions can be made. What constitutes the difference between diffusible and nondiffusible calcium is not yet established. The former has been pre-

sumed to be in the ionic state. The question of terminology, while important, may be misleading. It is not entirely essential that we shall know the full physical chemistry involved or the exact physical state of the calcium in its different forms since we can get much information whether we think of the calcium as fixed or unfixed, combined or uncombined, diffusible or ionic, or active.

By determining the total calcium in the blood and the total calcium in the blood serum, and again in ascitic and thoracic fluid, it is shown that there is a difference in the calcium in that all of the calcium is not diffusible, since the calcium in the ascitic fluid of edema is distinctly lower than that of the blood.

In these studies, I have undertaken to accumulate extensive data, and, for want of better names, will speak of the calcium as total, ionic, or active, physiologically fixed, and pathologically fixed, with the full realization that the terminology will probably be modified, but it is the most nearly suggestive that we know at the present time. It is quite probable that some such term as diffusible or active calcium is a safer one for the present, so I have added it after the word ionic. Since the calcium of the blood is largely lightly linked to a protein molecule, it has seemed wise to work out the total albumin, and total globulin, as well as the total protein, and also the various euglobulins. A group of these are considered with the calcium and phosphorus, in Table 2. Many things of interest are shown, one of the most important of which is the difference between the total calcium and the ionic or active, a difference which varies from 0 to 4.12, in the last case of the list. Two sets of figures will be noted for Case 1514; indicating determinations before and after extractions. This is the case in which the patient's blood sugar was reduced from 125 to 91 (referred to previously) as is shown in this chart; and it will be noted that the total globulin increased from 1.76 to 3.35 and the albumin:globulin ratio was restored much more nearly to normal. It is also of interest to note that the ionic or diffusible calcium increased from 9.48 to 10.06, approximately a half milligram, in ten days, during the early part of which the extractions were made. It is of particular interest that the patients with typical periodontoclasia, with tendency to suppuration, as in so-called pyorrhea alveolaris, tend, if not breaking physically, to have an ionic calcium above 10.5 and frequently over 11. These patients also have large apical areas about infected teeth. It is also significant that the individuals with an ionic or diffusible calcium below 9.0 are nearly always below par physically, and those below 8.5 quite seriously so.

We have in our pens a rabbit, now in splendid health, that, on two occasions, has been brought almost to the point of death by placing an ordinary infected tooth under its skin and removing it just before the crisis has come. In each instance, there has been a loss in weight and also a lowering of the ionic or diffusible calcium, which has returned to approximately normal with removal of the tooth.

Another important factor in this connection is the change in the blood morphology, in that the polymorphonuclears, which may increase at first, tend quite rapidly to decrease in percentage with a corresponding increase in lymphocytes. In a group of nine rabbits so studied, the average depression of polymorphonuclears was 17 per cent and the increase in lymphocytes was 17 per cent. I have previously shown that this progressive change in the number of lymphocytes is attended by a progressive depression in the calcium. For example, in one rabbit so studied, while the polymorphonuclears decreased from 57 to 31 per cent, a depression of 26, the lymphocytes increased from 34 to 62, an increase of 26 per cent. While this was occurring, the calcium varied as follows: The ionic or diffusible calcium increased at first from

TABLE 2.—CHEMICAL ANALYSES OF BLOOD

| Case | Alkalinity Index | Blood Sugar | Nonprotein Nitrogen | Inorganic Phosphorus | Calcium-Phosphorus Ratio | Total Calcium | Calcium, Active or Ionic | Calcium Physiologically Fixed | Calcium Pathologically Fixed | Total Protein | Total Albumin | Total Globulin | Euglobulin A. | Euglobulin B. | Eublogulin C. | Albumin-Globulin Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1008 | 25.70 | ..... | ..... | 3.65 | 3.21 | 11.702 | 10.33 | 0.54 | 0.833 | 7.95 | 4.41 | 3.23 | 1.612 | 1.361 | 0.262 | 1.37 |
| 1510 | 28.60 | 125.0 | 28.00 | 2.14 | 5.00 | 10.686 | 9.92 | 0.54 | 0.22 | 8.03 | 4.37 | 3.43 | 0.275 | 2.60 | 0.562 | 1.27 |
| 1511 | 29.75 | 118.0 | 27.00 | 2.72 | 4.57 | 12.462 | 9.92 | 0.88 | 1.662 | 8.60 | 5.13 | 3.293 | 0.075 | 2.318 | 0.275 | 1.56 |
| 1513 | 27.76 | 102.0 | 23.00 | 2.00 | 5.86 | 11.702 | 10.40 | 0.84 | 0.568 | 8.57 | 4.575 | 3.799 | 1.668 | 1.431 | 0.700 | 1.345 |
| 1495 | 38.26 | 136.0 | ..... | 5.20 | 2.36 | 12.24 | ..... | ..... | ..... | 1.212 | 0.576 | 3.610 | 0.256 | 0.469 | 2.870 | ..... |
| 1516 | 29.31 | 84.0 | 36.20 | 2.12 | 5.32 | 11.27 | ..... | ..... | ..... | 8.025 | 5.138 | 2.498 | 0.281 | 1.174 | 1.043 | 2.05 |
| 1514 | 37.20 | 125.0 | 28.00 | 2.87 | 4.08 | 11.71 | 9.48 | 1.65 | 0.58 | 6.96 | 5.08 | 1.76 | 0.068 | 0.418 | 1.280 | 2.88 |
| 1390 | 36.12 | 105.0 | 24.00 | 3.51 | 3.11 | 10.92 | 9.12 | 0.96 | 0.84 | 6.62 | 4.119 | 2.350 | 0.290 | 0.800 | 1.260 | 1.75 |
| 1515 | ..... | 117.2 | 36.00 | 4.83 | 2.33 | 11.25 | 9.62 | 0.52 | 1.11 | 5.65 | ..... | ..... | ..... | ..... | ..... | ..... |
| 1376 | ..... | 92.0 | 24.00 | 4.45 | 2.11 | 9.412 | 9.02 | 0.04 | 0.036 | 6.65 | 3.37 | 3.16 | 0.032 | 1.418 | 1.718 | 10.66 |
| 1519 | 34.54 | 121.0 | 31.00 | 3.73 | 2.74 | 9.40 | 10.22 | 0.0 | 0.24 | 6.55 | 3.985 | 2.375 | 0.319 | 0.644 | 1.412 | 1.675 |
| 1527 | 31.16 | 113.0 | 33.00 | 2.14 | 5.67 | 12.142 | ..... | ..... | ..... | 8.35 | ..... | ..... | ..... | ..... | ..... | ..... |
| 1514 | 36.70 | 91.0 | 27.50 | 3.78 | 3.32 | 12.54 | 10.06 | 1.14 | 1.342 | 6.638 | 3.10 | 3.352 | 0.406 | 0.187 | 2.668 | 1.00 |
| 1487 | 29.50 | 113.0 | 33.00 | 5.63 | 2.00 | 11.25 | 8.92 | 2.03 | 0.30 | 7.00 | 4.16 | 2.57 | 0.069 | 1.757 | 0.744 | 1.62 |
| 1521 | 39.10 | 83.0 | 26.56 | 5.45 | 2.12 | 10.54 | 9.52 | 0.10 | 0.81 | 6.72 | 4.14 | 2.410 | 1.075 | 0.700 | 0.627 | 1.71 |
| 1528 | 38.56 | 96.0 | 21.00 | 7.71 | 1.35 | 10.42 | 9.56 | 0.58 | 0.28 | 6.15 | 3.06 | 2.97 | 0.487 | 1.805 | 0.675 | 1.04 |
| 1520 | 32.12 | 113.0 | 28.00 | 3.29 | 3.62 | 11.92 | 8.96 | 2.7 | 0.26 | 6.95 | 3.51 | 3.26 | 0.418 | 1.272 | 1.600 | 1.08 |
| 1522 | 37.08 | 83.0 | 24.00 | 3.32 | 3.12 | 10.36 | 10.06 | 0.0 | 0.50 | 5.91 | 3.35 | 2.41 | 0.316 | 0.738 | 1.362 | 1.39 |
| 1267 | 34.12 | 90.2 | ..... | 4.13 | 2.91 | 12.07 | 9.04 | 0.93 | 2.094 | 5.705 | ..... | ..... | ..... | ..... | ..... | ..... |
| 1527 | 32.21 | 108.0 | 27.00 | 3.94 | 2.97 | 11.69 | 9.64 | 1.43 | 0.62 | 6.67 | 4.269 | 2.225 | 0.118 | 1.256 | 0.850 | 1.92 |
| 1526 | 30.15 | 84.0 | 33.20 | 3.28 | 3.25 | 10.70 | 7.00 | 2.34 | 1.78 | 6.92 | 4.651 | 1.993 | 0.650 | 0.600 | 0.743 | 2.33 |
| 1523 | 27.31 | 97.0 | 26.00 | 4.12 | 2.70 | 11.10 | 8.78 | 2.32 | 1.38 | 5.90 | 4.342 | 2.208 | 0.813 | 0.732 | 0.663 | 1.95 |
| 1525 | 42.20 | 103.0 | 22.50 | 3.14 | 4.00 | 12.56 | 7.84 | 3.78 | 0.94 | 7.21 | 5.63 | 1.400 | 0.219 | 0.806 | 0.219 | 4.04 |
| 1529 | 31.78 | 104.0 | 37.00 | 3.21 | 4.12 | 13.24 | 9.40 | 2.68 | 1.16 | 2.28 | 1.61 | 0.506 | 0.181 | 0.112 | 0.212 | 3.18 |

11.53 to 11.80, then dropped progressively on successive days to 9.45, 8.46 and 8.05. Meanwhile, the total calcium increased from 13.0 to 13.22, then to 13.66 and then dropped to 8.71 and 9.80. On the third day of the experiment, the total calcium had increased 0.66 gm. or from 13 to 13.66, during which time the ionic calcium had decreased 2.08 mg. or from 11.53 to 9.45. If, now, we had been studying total calcium only, the picture would have been very different; and whether this calcium factor is properly named as ionic or active calcium, while important in that it is most desirable that we understand its physical state, is not so important as the fact that we are dealing here with calcium in different forms, or at least with different bonds, and the evidence strongly suggests that the difference between the total calcium and the ionic or diffusible is, to a definite degree, both an expression and a measure of the divergence from normal of both the well-being and factor of safety of the person or animal.

Probably no phase of this whole problem of calcium metabolism is receiving so much attention today as are the factors that disturb or control disturbances in the formation and growth of bone. This involves not only rickets as a pathologic entity but also calcification of the roots of teeth and the functioning during pregnancy. It has been shown that rickets can be cured in some instances by a restoration to the diet of absent vitamins; that rickets may be cured by sunlight and ultraviolet light, and, just recently, that even the exposure of food to ultraviolet light will impart to it the quality that will enable the same dietary under which rickets developed to cure it. I have been making studies for some time, tending to throw light on the mechanisms involved in calcium metabolism. Among the important new data developed are the following: Since we can produce in rabbits a typical ionic or diffusible calcium depression similar to that which exists in our sick patients by the simple procedure of placing under the skin of a rabbit an infected tooth, we have used such rabbits as the experimental material for again increasing the calcium. This we have been able to accomplish by different means, but the effect is practically always temporary. Calcium in its various forms, whether as phosphate, lactate or chlorid, will have little effect when introduced into the stomach unless there is administered at the same time an internal secretion hormone. For example, by the addition of a small quantity of thyroid extract, the ionic or diffusible calcium is definitely increased but tends to fall again quite soon. A continuation of administration of the thyroid with the calcium does not hold it up but instead produces a lowering of the threshold for calcium in the small intestine, and the final level is lower than before. This effect seems to be largely due to the use of too large a quantity of thyroid. The administration of parathyroid extract with the calcium lactate has a distinct stabilizing effect, for its action seems definitely to be to assist the body in neutralizing the toxins produced by the infection.

In order to secure information bearing on the problem of how light acts on the body, we have made studies of the effect of placing animals, in which we have produced metabolic disturbances, out in the sunlight. One rat, for example, that had been kept in the dark and was placed on a diet deficient in vitamins, was in a state of complete collapse, lying on its side and gasping as though in the terminal stages of the vitamin deficiency disease. In this condition, it was placed out in the bright and direct sunlight and in two hours was up and running around and eating; and though kept on the same diet, but placed out in the sunshine frequently, it made rapid improvement. This and other such tests suggested that in some way the sunlight and similarly the ultraviolet light must act on some

TABLE 3.—BLOOD CALCIUM CHANGES AFTER INJECTION OF SERUM EXPOSED TO ULTRAVIOLET

| Rabbit | Serum Exposed Minutes | Before | After | Time After Injection | Active Calcium (Ionic) | Ca Ionic Plus Combined | Calcium In Combination |
|---|---|---|---|---|---|---|---|
| | | | | Hours | | | |
| 1318 | 15 | * | | | 8.74 | 9.23 | 0.49 |
| | | | * | 2 | 9.64 | 10.20 | 0.56 |
| 1312 | 15 | * | | 1 | 8.38 | 9.92 | 1.54 |
| | | | * | | 8.94 | 10.73 | 1.79 |
| 1340 | 60 | * | | | 9.18 | 9.90 | 0.72 |
| | | | * | 2 | 8.89 | 10.13 | 1.24 |
| 1340 | 20 | * | | 2 | 8.76 | 9.64 | 0.88 |
| | | | * | | 9.28 | 9.92 | 0.64 |
| | | | AFTER CALCIUM LACTATE AND THYROID BY STOMACH | | | | |
| 1340 | 0 | * | | 2 | 8.64 | 9.22 | 0.58 |
| | | | * | | 9.52 | 11.14 | 1.62 |

elements that are carried through the blood stream and probably on some of its constituents.

In order to determine somewhat of the mechanism of the radiation, we have made an extended series of exposures of blood serum and defibrinated blood to the ultraviolet light from a mercury vapor lamp, and we have found that, when the ionic or diffusible calcium of an animal has been lowered by the means indicated above of placing an infected tooth beneath the skin, the ionic calcium of such an animal could be materially raised in even one hour by the return to its circulation of some of the serum exposed for from ten to twenty minutes to ultraviolet light. Too long an exposure, as for example sixty minutes, made a depression in the ionic calcium from 9.18 to 8.89; whereas a twenty minute exposure of the same animal (Rabbit 1340), on another day, increased it from 8.76 to 9.28. The ionic calcium of Rabbit 1318 was raised from 8.74 to 9.64 two hours after the injection of the radiated serum, and that of Rabbit 1312 increased from 8.36 to 8.94 in one hour after fifteen minutes' exposure. These various factors are shown in Table 3.

In order further to study the effect of the light, we have used the blood of animals in different states of health, as well as that of patients, and have tested the capacity of the blood to produce impressions on photographic emulsions after being irradiated. For this purpose we have used, each, the ultraviolet light, the sun's rays concentrated with quartz lens (since glass obstructs the rays of the order with which we are concerned) and also radium radiation, from radium enclosed in glass. (No radium emanation was in contact with the blood.) A typical illustration of these is shown in Figure 12. This is the first publishing of this discovery although I have reported it in dental lectures, first in February, 1924.

There is probably much significance in our finding that the blood of an individual with high defense and in good health makes a stronger photographic impression than does the blood of an individual having marked symptoms of chronic focal infection.

These findings, that the blood was

directly capable of receiving energy, which it would give off as radiation, and that the efficiency of the blood seemed in a definite way to be related to this quality, led us to study various other sub-

Fig. 12.—Fresh rabbit serum exposed to ultraviolet light, then used to expose film.

stances, including oils, fats, proteins and aqueous chemical solutions, to ascertain what other substances possessed this quality on exposure to ultraviolet radiation or that from the sun and radium. Olive oil is but slightly affected in comparison with cod liver oil, which is very actively affected, and persists in throwing off radiations for an extended period. We have been able to make an extract from cod liver oil that is many times more sensitive than the raw oil.

I proceeded to use these products in connection with the calcium lactate to ascertain the influence that they would exert on its metabolism. These results have been very marked and satisfactory in certain cases of delayed calcification in children and in benefiting expectant mothers. This can best be illustrated by a detailed reference to individual cases.

A boy with delayed calcification has grown eleven-sixteenths inch in about two months, although he had grown very little the preceding two years. The remarkable change in the calcification of his teeth is shown in Figure 13, which shows the roentgenographic appearance at 7 years and 4 months, and again at 11 years and 3 months, when the treatment was begun. It will be noted that the deciduous molars are in position over the forming bicuspids, and the roots of the latter are greatly delayed in calcification. These deciduous teeth were not loose, but, in five weeks after starting medication, these deciduous teeth were so uncomfortably loose that it was necessary to remove them; and, in the third view, showing the appearance at 11 years and 6 months, or three months later, it will be seen that there is a distinct change in the structure of the supporting bone and in the progress of root calcification. The boy's appearance, appetite and mental attitude have all changed. In two months, both his diffusible or ionic calcium and his inorganic phosphorus showed marked increase. This case is presented in Table 3.

The improvement in a typical case of calcium stress of pregnancy is presented in Table 4, in which it will be seen that fatigue was changed to exhilaration, depression to animation, poor appetite to an excellent appetite; and in twenty-four hours the level of the diffusible or ionic calcium was distinctly raised, as were also the levels of inorganic phosphorus, total protein and total globulin of the blood.

Another expectant mother, also in a second pregnancy, in five weeks gained 11¾ pounds,

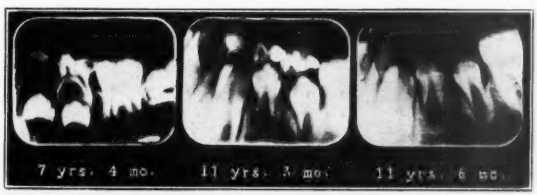


Fig. 13.—Calcification changes produced in three months by medication.

and lassitude and weariness, which only allowed her to be up an hour or two a day, changed to such physical well-being that she got up in the morning and remained up all day without even resting.

In these cases, I am recommending at present for children one 5-grain tablet

TABLE 4.—DISTURBED CALCIFICATION OF CHILDHOOD*

| Conditions or Symptons | Before Treatment | After Treatment (2 Months) |
|---|---|---|
| Total weight | 70 lbs. | 74 lbs. |
| Height | 4 ft. 5½ in. | 4 ft. 6 3/16 in. (Gain 9/16 in.) |
| Physical state | Poorly nourished | Looks better nourished |
| Nervous state | Listless, irritable | Very anxious to go to school |
| Digestive condition | Poor appetite, shunning fruits and vegetables | Good appetite, now likes vegetables |
| Blood active calcium | 9.06 | 9.56 |
| Inorganic phosphorus | 2.65 | 7.71 |
| Calcium balance | —24 | +73 |

*Case 1528; patient, aged 11½ years.

of calcium lactate, three times a day and a 0.5 c.c. capsule of cod liver oil that has been exposed in an open dish to bright noonday sunshine, both given with meals and preferably five days a week, stopping two, and to adults about twice this quantity. It is easy to overdose with activated cod liver oil, and sunshine is proving better than ultraviolet rays from a quartz mercury art lamp.

In our cases of pregnancy, we have noticed a complete change in the viscosity of the saliva, and an absence of caries. In children with marked tendency to caries, we have found this treatment exceedingly beneficial.

This important advance is the direct result of the intensive chemical researches on the blood of individuals in these various abnormal states and their comparison with the normals, and is a splendid indication of how the intelligent application of pure science will rapidly change dentistry from the maintenance of a system of repair shops, which amounts to furnishing substitutes and crutches, and must in a sense be considered a failure as compared with that newer type of dental service that is coming out of this work, by which teeth will be kept from the ravages of caries and thereby not only will the necessity for the fillings be avoided, but, more important, the possibility of apical involvement due to pulp infection and devitalization be avoided, with its tragic sequelae reducing one's efficiency and comfort and even the duration of life, by the development of the degenerative diseases in susceptible and overloaded individuals (which we all at times of stress become).

If time and space permitted we should report in detail on several other problems on which our researches have furnished important new data. We shall only briefly refer to one. In a recent paper,[2] I presented data that reveal an important relationship between the types of disease from which individuals suffer and the types of dental pathologic proc-

2. Price, W. A.: Some Structural and Biochemical Factors Involved in Dental Infections and Related Degenerative Diseases, J.A.M.A., 84: 254 (Jan. 24) 1925.

TABLE 5.—CALCIUM STRESS OF PREGNANCY*

| Conditions or Symptons | Before Treatment | Time Elapsed | After Treatment |
|---|---|---|---|
| Disturbance | Many boils | 6 weeks | Complete absence |
| Physical state | Fatigue | | Exhiliaration |
| Nervous state | Depression | | Animation |
| Digestive condition | Poor appetite and nausea | | Excellent appetite, no nausea |
| Blood active calcium | 10.06 | 24 days | 10.28 |
| Inorganic phosphorus | 3.32 | | 3.87 |
| Total proteins | 5.91 | | 7.12 |
| Total globulin | 2.41 | | 4.02 |

*Case 1522, second pregnancy in a woman, aged 30; treatment begun at third month.

esses which tend to develop in those individuals. Our accumulating data reinforce that general finding, which may be briefly expressed as follows:

Calcification and decalcification processes are related to fundamental systemic factors that determine qualities of defense and susceptibility to certain types of diseases on one hand and the nature and type of reaction about a zone of infection on the other. Thus, patients with a marked tendency to periodontoclasia, or pyorrhea, do not tend to develop proliferative arthritis but do tend to be susceptible to diabetes, tuberculosis, anemia and cancer; and, conversely, patients with a marked tendency to calcification about dental infections tend to have a much smaller amount of rarefaction about the apices of infected teeth than do patients with pyorrhea. These are the group in which are found the cases of proliferative arthritis and as a rule are individuals that do not develop cancer or tuberculosis of the miliary pulmonary type. In other words, the lesions tend to heal, probably by calcification of the tubercle; whereas, in the former group there is a tendency to make a poor defense, probably by the reverse process of decalcification or lack of calcification of a tubercle. Any person may check this by finding for me, if they can, one single instance of a patient with proliferative arthritis who is suffering from either cancer or progressive tuberculosis. I have not been able to locate one single case. (We might expect to find a case of degenerative arthritis although I have not yet definitely done so.)

Table 5 presents a consolidation of these general data. In Column 1 will be seen the three fundamental types of reaction in bone, which are used as the basis for this observation. The first group is the one with extensive decalcification, as large apical areas or extensive gingival absorptions, recorded as "rarefying osteitis with extensive decalcification." The other two groups show, progressively, tendencies to absence of decalcification in the presence of an irritant, and tendency to calcification. The first group is conspicuously absent in susceptibility, as shown in the second column, to the rheumatic group disturbances, though under sufficient overload they

TABLE 6.—SUMMARY OF DATA

| RELATION OF CALCIFICATION AND DECALCIFICATION TO TYPE OF SYSTEMIC DISEASE | | | | SYSTEMIC DISTURBANCES STREPTOCOCCAL AND NONSTREPTOCOCCAL | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type of Local Reaction In Bone | Susceptibility Group | Blood (Ionic) Calcium Active | Bactericidal Efficiency of Blood for Streptococci | Heart | Proliferative Arthritis | Acute Rheumatism | Caries | Kidneys | Stroke | Nervous Breakdown | Degenerative Arthritis | Neuritis | Skin Sensitizations | Hypertrophic Rhinitis sen's. | Asthma Sensitization | Periodontoclasia (Pyorrhea) | Hay Fever | Extensive Salivary Calculus | Diabetes | Tuberculosis | Cancer |
| Rarefying osteitis, with extensive decalcification | Absent | Normal or high | High | | | | | | | | | | | | | * | * | * | * | * | * |
| Condensing osteitis about extensive rarefying osteitis | Acquired | High or subnormal for individual | Subnormal | | | | * | * | * | * | * | * | * | * | * | * | * | * | * | | |
| Condensing osteitis, or very slight rarefying osteitis, or both | Inherited | Subnormal or low | Low | * | * | * | * | * | * | * | | | | | | | | | | | |

tend to break and then enter the next group, the acquired; whereas, the third group tends by inheritance to be chronically susceptible. The active diffusible or ionic calcium tends to be higher in proportion to the defense, as does also the bactericidal efficiency of the blood, both of which are shown in Columns 3 and 4. In Column 5, "Systemic disturbances, streptococcal and nonstreptococcal," we see, as pointed out in the text above, the marked difference in the type of systemic involvement that tends to develop in these different groups. Individuals with a marked inherited susceptibility to the rheumatic group diseases do not tend to have cancer, tuberculosis or diabetes, diseases which tend to involve the individuals whose natural defense is high in this regard. The sensitization reactions appear chiefly also, in this and the group with an acquired susceptibility, owing largely to overload plus infection. On this basis of tendency to calcification or to decalcification is expressed, apparently, a strong factor regarding capacity to resist tuberculosis. Those in whom decalcification takes place make the

poorer fight against this disease. Is it a question, in part of calcification or decalcification of tubercles? I have not, as yet, been able to find a patient with typical multiple proliferative arthritis with either tuberculosis or cancer. Can a reader refer me to one? (Not the degenerative type.) Why do diabetics tend so strongly to have periodontoclasia? Our newer data suggest that the anemias tend to develop in the groups showing a tendency to decalcification. This is discussed at greater length in the article referred to.[2]

Time does not permit a more complete discussion of this phase in this paper, nor does it permit the presentation of new data relating to the causes of pulp degeneration and newly discovered factors involved in the repair of sockets after extractions. These will be presented in a later communication.

When we contemplate the suggested significance of many of these findings herewith reported and, further, the fact that we have simply pried open some additional windows, I find myself depressed with a sense of profound regret that we do not have an institution equipped, endowed and manned, and pushing forward with all possible rapidity researches in these various lines. Perhaps the saddest phase of our situation is that we have so few men under special training and preparation for attacking these problems. If we had, the time might be moved forward by decades when suffering humanity might be expected to be relieved. I find myself continually asking whether this generation could not do more for the next. If, as seems now clearly demonstrated, dental infections are very important and often determining factors in the etiology of degenerative diseases, an opportunity for human service lies at the door of this generation such as probably has never been possible to any other. Just as Lister, probably more than any other man, had a mind prepared for the great truths regarding the relation of infections to disease, which Pasteur discovered, and therefore was able to apply those great principles to surgery, with results that revolutionized that science, just so had we prepared minds today, the newer knowledge of biology would, by its application to dental problems, bring a period of human health betterment that would go into history as one of the brightest of medical progress.

# INCISAL RETENTION VS. LINGUAL RETENTION

By W. R. CLACK, D.D.S., Mason City, Iowa

(Read before the American Dental Association, Dallas, Texas, November 10-14, 1924)

THE primary object of dental operations is the saving of the human teeth, and it stands to reason that we should use such methods as will best accomplish the sought for result. Since what would be proper for a child might not be best for an older person, because of the different conditions, we will confine ourselves in this discussion to operations for adults.

We find in many cases of cavities in the anterior teeth that accident or decay has resulted in the loss of an incisal angle. In the majority of cases, it is the result of a cavity of decay in the proximal surface of a tooth that has been neglected until the enamel of the angle has been undermined. It is useless, when there is a possibility of occlusion, to try to retain an angle of enamel unsupported by dentin. It is better to eliminate the angle until sound dentin is reached and to restore it with gold. When this is done, the point of greatest liability lies where the stress of occlusion comes on the incisal angle. There is a difference of opinion as to how the retention of such a restoration is to be accomplished.

Some operators cut the labial plate of enamel straight from incisal to gingival, or cervical margin and attempt retention by means of a cavity cut in the lingual surface of the tooth, about two-thirds of the way from incisal to cervical surface and carrying the filling over into that. This method is open to the objection that the point of resistance is not at the point where stress comes, and that it leaves the most vulnerable part of the entire cavosurface angle without protection. We are inviting failure from the start. The line of leverage to unseat the filling is longer than the line of resistance.

Another objection is that the cavity margin of such a restoration comes at the weakest place on the incisal edge of the tooth. On the labial surface of an anterior tooth are two grooves, called the developmental grooves. By reason of the faulty position of the enamel rods in these grooves, there is a weak spot in the enamel of the tooth just where the margin between enamel and gold comes.

The cutting of a cavity in the lingual surface of a tooth large and deep enough to admit the anchoring of such a filling places so large a mass of gold near the pulp that death of the pulp from thermal shock frequently takes place. A more dependable method of retention lies in placing the resistance at the point where stress comes, and fighting dislodgment from occlusion on more even terms. There are two ways of doing this. One is known as the Wedelstaedt preparation, which should be used when there is heavy occlusal stress and the showing of gold is not objectionable. The other

is known as the Johnson preparation. It is more esthetic by reason of showing less gold and may be used when there is slight or no occlusion. The principle of retention is the same, and each is better in its proper place than is the other. In a cavity cut in an incisor after the method first spoken of, the resistance is not at the point where the greatest stress comes. The man who made this preparation for me used it for years in his practice. When asked why he had discarded it, he said, "Because so many of the operations failed when there was stress. No matter how closely I adapted it, it would not stay, but would pull away and leak at the incisal."

At the 1902 winter meeting of the G. V. Black Club of St. Paul, three operations were made in the proximo-incisal surfaces of upper incisors by a very able operator who advocated the lingual retention. They were beautiful operations, but within two years all three failed from stress. The same teeth were refilled by a member of the G. V. Black Club, with the incisal retention, and all of them are doing service today.

The Wedelstaedt preparation places the resistance where the stress comes. A step cut in the labial plate and gold carried into that protects the proximo-incisal angle of enamel from stress. There is a showing of gold on the labial surface, but foil fillings malleted into this kind of preparation have withstood the stress of heavy occlusion for a quarter of a century and are protecting the tooth as well today as when first placed. There is a showing of gold, but the hand of man cannot make a filling by any other method that will protect a tooth under heavy stress as many years.

The Johnson preparation is the same in principle as this except that less of the labial plate is cut away and very little gold is shown. It is indicated in the teeth of women, and when there is little or no occlusion. The Wedelstaedt and Johnson preparations are almost identical. The cervical preparation is the same. The line from cervical to incisal margins curves more in the Johnson preparation. There is a clearly defined step at almost right angles in the Wedelstaedt. The incisal retention is the same. The square step on the lingual is the same.

In 1898, I placed gold fillings in the mesio-incisal surfaces of the upper central incisors of a young woman from a neighboring county. I made only the two because, when the father paid the bill—$15 each—he assured me that I was a robber. After his death, twenty years later, the daughter came back to me. Of her upper teeth, there remained the two cuspids, a lateral incisor root with a "peg crown" and the central incisors, both pulpless. The distal surfaces of both teeth had been filled and refilled until the whole distal part of the tooth was gone, but the two foil fillings malleted in, in 1898, were still good. The margins, six years after the teeth have been extracted, are perfect yet.

For several years I have been seeing more and more failures of fillings made in the proximo-incisal surfaces of the anterior teeth after the lingual retention method, but what finally caused this protest was two calls I received one day last spring from patients referred to me from the hospitals in our city. One was a woman whose three upper anterior teeth on the left had all had angles restored by the lingual retention method. All the restorations were failures, and two of the teeth had putrescent pulps. The other patient, a woman of about 35 years, had had five of the six anterior teeth filled in this way. All the fillings were failures, and three of the teeth were putrescent.

There is something wrong in the

method or the men. With the opportunity of today, this generation should be the finest gold operators the world has ever known. A gold filling that fails to protect after two or three years is a farce and a disgrace to our profession.

DISCUSSION

*F. W. Schaefer, Omaha, Neb.:* There seem to be more opinions on cavity preparations in the restoration of incisal angles than any other class of cavities. We also find that nearly all the teachers of operative dentistry advocate incisal retention. There must be reasons for this. With most of these incisal preparations, there is about twice the amount of cavity seat at right angles to the stress as in the case of preparations with lingual retentions. This means that the restoration is being driven into the cavity. The permanence of incisal retention is so well established in the neighborhood in which I practice that a gold foil restoration is rarely seen, when lingual retention has been used. It is frequently used when inlays are used to restore the incisal angle. In many of these cases, the gold flows under the stress of mastication, on account of insufficient bulk, and leaves the cavity wall. In the past few months, I have examined a few incisal angle restorations and found only one inlay with lingual retention that the operator could be proud of. The patient had worn it eight years. Most of the other inlays were pulling away at the incisal.

One of the most important things Dr. Clack said was that foil fillings malleted into these incisal preparations have withstood the stress of occlusion for a quarter of a century. Taking it for granted that the employment of gold foil is the best method to restore incisal angles, if one uses lingual retention entirely, the correct line of force is so difficult that in most instances the filling will be faulty. The G. V. Black Club, the Wedelstaedt Club, the Woodbury Study Club, the Prime clubs and others are doing wonders in making foil operators and teaching the profession to use gold foil when it is indicated.

As a member of the Woodbury Study Club, I want to say that what I have learned there has made proximo-incisal restorations much easier for me, and more satisfactory; and nearly every time such a restoration presents itself, I think of this statement of Dr. Woodbury's: "Give me a cavity where gold foil is indicated and I will make a better restoration with foil than anybody can make with any other material, and anyone who has paid the same attention to technique as I have can perform just as good an operation."

*H. B. Tileston, Louisville, Ky.:* In these days of discussions and papers on deeply scientific subjects, focal infection, bacteriology, etc., it is quite refreshing to hear something about a procedure in actual practice.

Dr. Clack has presented a clear and concise argument in favor of the incisal rather than the lingual retention. All of us who have been practicing for any number of years have seen cases in which a restoration has been made with dependence on the lingual retention, and we have seen them fail just as Dr. Clack has seen them fail, because they are not mechanically correct.

In a cavity of this form, for instance, (using one of Dr. Clack's models), the filling itself gives us a lever of the second class. We have the fulcrum at the cervical. We have the weight or resistance at the lingual surface while the force is applied at the long arm of the lever on the incisal portion of the tooth, which explains why such fillings are so readily displaced; the resistance is so far from the force that is exerted on the filling after it is completed.

Dr. Schaefer mentioned the flow of gold, especially pure gold, under stress, the filling actually flowing out or being forced out of position because of the retention on the lingual to the incisal surface where the force is exerted, resulting in a displacement of that part of the filling by flowing or by actual bending of the mass, depending on the strength of the long arm of that lever or the breaking down of the enamel rods next to the filling material, due to stress.

The incisal retention places the mass in the shape of a lever of the third class, in which we have the fulcrum at the gingival and the resistance at the point where the force comes in the middle of the mass. Therefore, we have a resistance sufficient to counteract or combat the tendency to displacement.

It is evident that the incisal retention is preferable, not only as regards the use of gold foil but for inlays as well. Having had a good deal of experience with gold foil, though not following it up so closely as I did in former years, I agree with Dr. Clack and others who have had long years of experience that it is possible, with proper technic and skill, to make a better filling with foil than with any other material. I believe that if you would look

over the fillings with a long history, you would not find so many still standing up that are made of any other material. I have seen fillings from the old operators that have been in place forty-five or fifty years and I do not believe that any inlay can better that. Sufficient time has not elapsed in the history of inlays to say whether they will last that long or not. I have seen many of them fail in much less time, and I have seen operations with foil, even by young operators, which have stood for many more years than I have seen inlays stand.

But we naturally shrink from the labor of packing in gold. As I see from time to time some of the foil restorations that I have made in years past and in which I used to take delight, I wonder how I ever did it. It is so easy for us to use silicious cements, or the porcelain or gold inlay, that we shrink from the manual labor necessary to put in foil fillings, even though we get better results.

This method of cavity preparation is applicable also to inlays, either porcelain or gold, in which case we would use a modification of the preparation shown in the model.

The changes requisite to adapt this cavity to receive an inlay are elimination of all undercuts and provision for a pin in the incisal step in the case of a gold inlay, or a definite boxlike depression at the extremity of the step in case porcelain is used.

There may be some cases in which use of the lingual retention is justified, but they are rare.

*C. N. Johnson, Chicago, Ill.:* I just came in to this section to visit and do not care to go into a technical discussion of the subject. There are many factors that enter into our work as dentists, and it so happens that when I am considering all of these subjects there is one individual that I confess is more prominent in my mind than any other, and that is the patient in the chair.

The arguments here presented are fundamental. They have been carried on for many years until they are part and fiber of our professional faith so far as the anchorage of fillings is concerned. But in this age, as in every age, we must adapt ourselves to new points of view not only in our relation to the subject but also in the relation of the patient to the subject.

I am just as firm a believer as I have ever been, and I think I am always going to be as firm a believer in the method of restoring lost tooth tissue by gold foil as any man in this room. As has been said, there isn't any other operation in dentistry that will give us the same reliable service year after year as will these gold foil operations when properly done.

I have made the statement many times that there never has been devised in the alchemy of Nature, that man has become cognizant of, any other plan of so surely saving a tooth that has been decayed as by the insertion of a gold foil filling where the preparation of the cavity is correct, where the technic of inserting the gold is correct, where the adaptation is as nearly perfect as we can make it and where the finish and condensation are as nearly perfect as we can make them.

Taking that as the basis of our professional faith, we must then begin to consider the attitude of the patient toward it, and I want to confess that, in my own vicinity, and I am convinced that the same is true in very many other vicinities, we have another factor to deal with and we have the prejudice, if you want to use a word as strong as that, of the patients against the needless display of gold. That is something that must be considered. We must be frank with our patients and tell them that a certain operation is going to be more reliable and more nearly perfect than another kind of operation, but we must accede to a reasonable degree to the point of view of our patient, and in my own practice I no longer permit, nor do I always urge the matter, of making large restorations of gold where they are very conspicuous.

The patient is entitled to that consideration, and there are many people today who want to save their teeth, who are willing to cooperate with the dentist, but who will not submit to an operation in gold that is going to be conspicuous in their mouths. We must take cognizance of that and try to make a filling that is the least noticeable, even though it may be more temporary.

Be honest with the patient and tell him it is likely to be more temporary than a filling that will advertise itself to the world.

We have to revise our ideas all along the line. I am going to contend as strongly as anybody for the mechanical principles involved in the anchorage of fillings, in the anchorage of inlays. It is not in line with the subject at this time to tell how those fillings shall be made so that they will not be conspicuous. You all know that. But I do feel that we have to do this one thing; we have to look at the patient's side of it and consider his point of view. Back beyond all of our deliberations, there is that one individual that

we so often forget when we get into these meetings, and that is the patient in the chair. All that enters into our problems, our educational problems, our scientific problems, everything connected with our progress, must in the ultimate analysis come down to the welfare of the patient in the chair.

*Dr. Clack (closing):* Dr. Johnson is right as he always is. The patient should be taken into consideration. In fact, we are considering the patient's welfare by this style of anchorage. The filling that fails in one, two, or three years never was right. I have seen fillings made after the Johnson preparation that were beautiful after many years because the occlusion was taken into consideration. It is the preparation in which the occlusion is light or lacking that does not fail. Dr. Wedelstaedt was continually teaching, "Look at the occlusion." Where the occlusion is heavy there is but one preparation—that advocated by Dr. Wedelstaedt. If the gold is properly condensed, it will last longer than the enamel on the rest of the incisal edge of the tooth. But it will not do that if the preparation is hurriedly or imperfectly made. The margins must be planed, not finished with stone or burr. A man beside whom I have practiced forty years, whose margins are a "dream," said to me a few days since, "Dr. Clack, do you know that many of the margins we see are finished (?) with a cross cut burr." Can you wonder that there is a recurrence of decay? I am pleading for more care in the doing of these operations, less thinking of how tired you are going to be after making a foil filling. As to thinking of the patient, as Dr. Johnson says, "due consideration should be given to the physical condition of the patient," which is right; but you will remember that I have said, "where it is indicated." I make what I think is indicated or I do not make anything. There is no more pain to the foil operations than in any other if you are careful. When the rubber dam is adjusted—and no foil filling or inlay can be made or placed properly without it—some sterile gauze should be tucked between it and the face and much of the unpleasantness can be avoided. I will not make such operations without the dam. There are two dentists in our building who have had no rubber dam in their offices in several years. Gentlemen, is that practising dentistry? You remember, Dr. Johnson, that at the G. V. Black Club, Inc., of St. Paul, the first question asked an applicant for membership was, "Do and will you use the rubber dam in all operations on the human teeth?" And the man who could not hold up his right hand and assent to that could not become a member. I am not opposed to the making of inlays. Where they are indicated, you may be able to make a tooth comfortable and serviceable by the use of an inlay where a gold foil filling is not indicated, but that does not alter the fact that, where it is indicated, the foil filling will preserve a human tooth longer than any other, and, as I said in the beginning, "The primary object of dental operations is the saving of the human teeth."

# A REVIEW OF THE LITERATURE ON THE EUSTACHIAN TUBE, WITH DATA INDICATING A RELATION TO THE DENTAL OCCLUSION

By TOM SMITH, D.D.S., Los Angeles, California

(Read before the American Dental Association, Dallas, Texas, Nov. 10-14, 1924)

THE eustachian tube, the channel of communication between the tympanic cavity or cavity of the middle ear and the pharynx, was first described by the Italian physician, Eustachius, who died in 1574.

The function of the tube, which is a remnant of one of the branchial clefts of the embryo, is to equalize the air pressure on both sides of the tympanic membrane and to drain the middle ear and mastoid cells.

Piersol[1] gives the following description:

> The superior orifice of the eustachian tube is in the upper part of the anterior wall of the tympanum, and is, therefore, not well adapted for drainage of that cavity. The tube is directed downward, forward and inward to the side of the nasopharynx, where it is on a level with the posterior end of the inferior turbinate bone. In children, it is wider, shorter and more horizontal, so that in infection of the middle ear, drainage in them is better, but, for the same anatomical reasons, otitis media is more likely to follow pharyngeal and tonsillar infections. The pharyngeal orifice is bounded above and at the inner side by the prominent cartilaginous arch which encloses a funnel-shaped opening. The mucous membrane over this projection is thickened by a cushion of adenoids and enlarged tonsils, and may occlude the tube, ultimately causing deafness. The upper border of the pharyngeal orifice of the tube is *a half inch above the soft palate*, and the same distance below the basilar process, below the hinder end of the inferior turbinate bone and in front of the posterior pharyngeal wall (Tillaux). Immediately behind the orifice is the well-marked depression called Rosenmuller's fossa, the depth of which is increased in cases of enlargement of the pharyngeal tonsil and which may then lead to difficulty in the passage of a catheter into the eustachian tube. The length of the tube is about 37 mm. (1½ inches) and its pharyngeal opening is about 25 mm. (1 inch) lower than the tympanic. The upper third (12 mm.) is bony, and its lower two-thirds (25 mm.) cartilaginous. The narrowest part, the isthmus, is at the junction of these two portions. The lumen of the cartilaginous portion forms a somewhat S-shaped slit, the walls being in actual contact, except during the act of swallowing, when the slit opens so that air may reach the tympanum and equalize the atmospheric pressure on both sides of the tympanic membrane. In the bony portion, though the lumen is smaller, it is open. In cases of obstruction of the tube at its pharyngeal end—as by pressure from a growth, or from thickened mucosa—the outside pressure predominates, the tympanic membrane is pushed inward, and buzzing or "singing in the ears" (tinnitus) results. Whenever the palate is raised or deglutition takes place, the tensor palati and levator palati contract, and in so doing open the eustachian tube by traction on the fibrous tissue which unites the outer borders and the fibrocartilaginous scroll of which the tube is composed.

Figure 1*A* is a transverse section of the cartilaginous tube, from Piersol, showing the relationship of the tensor and levator palati muscles to the tube.

Figure 1*B*, a median section of the head and neck, after Spalteholz, nicely illustrates the relationship of the various parts to the pharyngeal opening of the eustachian tube, showing particularly well the close proximity of the opening to the soft palate and to the

1. Piersol, G. A.: Human Anatomy, Ed. 7, Philadelphia, J. B. Lippincott Company, 1919, Vol. 2, p. 1507.

bulk of the tongue just below the soft palate.

matic illustration of the organ of hearing.

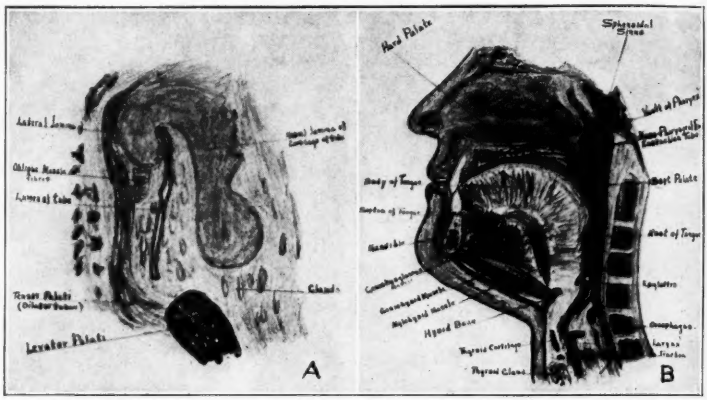


Fig. 1.—*A*, transverse section of cartilaginous eustachian tube (after Piersol); *B*, median section of the head and neck, right half (after Spalteholz).

Figure 2, from McKenzie, gives four different views of the pharyngeal orifice of the tube.

Figure 3, from Piersol, is a diagram-

Continuing, Piersol[1] describes the mucous membrane lining of the tube.

The eustachian tube is lined throughout its entire length with mucous membrane, which

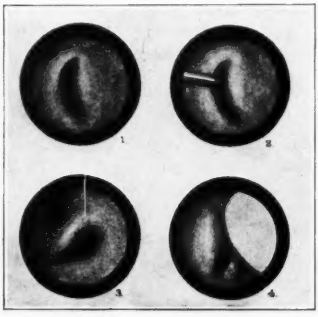

Fig. 2.—1, endoscopic view of the pharygeal orifice of the right eustachian tube; lips slightly congested and in contact, from catarrhal swelling. 2, same as view 1, with eustachian tube inserted. 3, endoscopic view of the left eustachian orifice, showing a prominent posterior lip and a deep fossa of Rosemuller behind it. 4, endoscopic view of the left eustachian orifice with an enlarged posterior end of the left inferior turbinal body (subsequently removed by snaring).

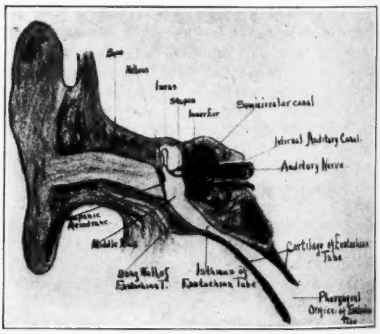

Fig. 3.—Diagrammatic illustration of organ of hearing (after Piersol).

differs somewhat in the cartilaginous and osseous portions. That in the former resembles the mucous membrane of the nasopharynx, with which it is continous, whilst that of the osseous division resembles, to some extent, the mucous membrane of the tympanic cavity. The *epithelium* of both divisions con-

sists of the ciliated stratified type, with some goblet cells, but the cells in the pharyngeal division, especially in the lower part, are taller than those of the tympanic portion, which are low cuboidal.

This condition allows of a natural passage for infections from the throat to the eustachian tube, middle ear and mastoid cells.

In describing this part of the tube, Ballenger[2] says:

The tympanic opening corresponds to the anterosuperior quadrant of the eardrum; hence it is not in the most dependent position of the cavity. This does not interfere with drainage under normal conditions, as the ciliae of the epithelium of the tympanic cavity sweep the secretions to the opening of the tube and through it to its pharyngeal opening. If, however, the ciliae are impaired in their functional activity by an inflammatory or other morbid process, the elevated position of the tympanic orifice of the tube materially interferes with the drainage. Under these conditions, the secretions are retained, decomposition follows, and further irritation of the mucous membrane results.

MUSCLE CONTROL

All recognized authorities are of one opinion regarding the importance of the muscle control of the eustachian tube, and the pathologic conditions resulting in the tube and middle ear when muscle tone is lost.

Dench[3] comments as follows:

Since the aeration of the tympanum is accomplished through the action of its (the eustachian tube's) attached muscles, the part played by them in audition is one of importance. When, owing to atrophy of the tubal muscles or to obstruction of the lumen of the canal from swelling of the lining membrane or from the pressure of secretion, the passage remains closed for a considerable period, rarefaction of the air within the tympanum is the result.

Beck,[4] in discussing a paper on the eustachian tube, comments as follows: "Too little attention is paid to the eustachian tube, particularly to the muscular apparatus of the tube." He thinks that the result often obtained by the removal of the tonsils is due to the change produced on that little muscle which comes from the palate and extends around the eustachian tube opening. Hence, these parts have again reestablished themselves.

Politzer[5] says: "The changes in the muscles of the eustachian tube are of importance, so far as, by their decreased power of action, the ventilation of the middle ear, necessary for the function of hearing, is interrupted."

A great number of authorities could be cited on this muscle control of the eustachian tube, but I will cite but one more, Dr. Rich,[6] whose exhaustive investigations at Johns Hopkins University, would appear to be conclusive.

The tympanic membrane functions perfectly only when the atmospheric pressure is the same on both sides of it. The tension resulting from an inequality in pressure may cause a severe pain from bulging and stretching of the membrane, may even be sufficient to rupture it, and in all cases impairs its vibratory function until pressure equilibrium is again restored. This equalization of pressure is made possible by the inflow of atmospheric air from the nasopharynx through the eustachian tube into the tympanic cavity until the tension of the air within the cavity becomes identical with that of the air in the external auditory canal.

Rich quotes many authorities in covering the muscle control of the eustachian tube, the preponderance of belief being that the tube is open only during the functions of swallowing and yawning. Others assert that it is open during intense respiration, some stating that it is closed during deglutition. His own experiments appear to be most thorough and extensive. He says, "These experi-

2. Ballenger, W. L.: Diseases of the Nose, Throat and Ear, Ed. 3, Philadelphia, Lea & Febiger, 1911, p. 601.

3. Dench, E. B.: Diseases of the Ear, New York, D. Appleton & Co., p. 56.

4. Beck, J. C.: Disc. Lewy, Alfred: Massage of the Eustachian Tube, Ann. Otol. Rhinol. & Laryngol., 25: 1087 (Dec.) 1916.

5. Politzer, Adam: Diseases of the Ear, Philadelphia, Lea Brothers Co., 1902, p. 279.

6. Rich, A. R.: A Pathological Study of the Eustachian Tube and Its Related Muscles, Bull. Johns Hopkins Hosp. 31: 206 (June) 1920.

ments lead us to the conclusion that the tensor palati muscle alone is responsible for any change that occurs physiologically in the patency of the pharyngeal orifice or lumen of the eustachian tube."

Fig. 4, from Spalteholz, illustrates the tensor palati muscle, giving a good idea of its relationship to the tube.

### SOME PATHOLOGIC RESULTS FROM LACK OF VENTILATION AND DRAINAGE

Randall[7] says:

"The proper ventilation of the drum cavity is needful to perfect function. It is said that the head of a military drum will split if there

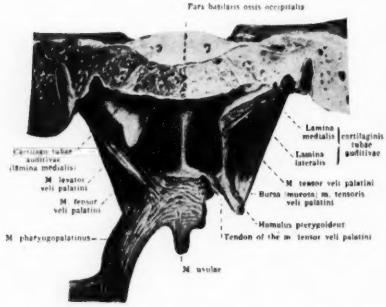


Fig. 4.—Tensor palati muscle; showing relationship to eustachian tube.

is no opening in the side; and certainly a stuffed eustachian tube makes all concussions painful, if not damaging, to the drum membrane. Any excess from within interferes with the freedom of the windows, while any lack of air makes pressure on the outside preponderant, forcing in the drumhead and, through the chain of bones, pressing on the labyrinth. More than this, if the partial vacuum in the drum cavity is increased through absorption of the unrenewed air by the moist lining, the drumhead becomes stretched until it collapses and comes into contact with the inner wall; or the walls congest, swell and fill the space or the fluid is poured out to occupy the cavity. Generally, all of these results are present in varying degree, and from this comes the large majority of ear diseases. It is not surprising, then, to find that two-thirds of ear patients have middle ear trouble, only one-fourth external ear affections and in hardly one-tenth is the percipient nerve apparatus at fault. This explains why much of the treatment of ear diseases must be directed to or through the nose and throat in the effort to restore free ventilation and repair the injury due to the lack of it."

Ballenger[2] (page 605) states: "Anything that interferes with the normal tension existing between the membrana tympani, the ossicles and the contents of the oval window will cause tinnitus and deafness." And again (page 609) "When the normal tension of the drumhead is disturbed, there is an impairment of the hearing; hence, any morbid condition of the eustachian tube which interferes with the ventilation of the tympanic cavity, or any inflammatory disease of the mucous membrane which interferes with the mobility of the ossicular chain, or any morbid condition of the drumhead which interferes with its elasticity or motility will cause more or less deafness."

Dr. Ide,[8] of Los Angeles, cites some interesting cases of closure of the eustachian tube accompanied by tinnitus and marked loss of hearing due to slow eruption of wisdom teeth, which caused pressure on the tubes from the swelling of the soft tissues, due to the erupting teeth.

McKenzie[9] states: "The ordinary dullness of hearing which so frequently accompanies nasal and nasopharyngeal catarrh is due to eustachian catarrh. . . . The dullness and other symptoms are due to a blocking of the eustachian tube by catarrhal swellings and secretions, in consequence of which the middle ear is shut off from the pharynx, so that the air in the tympanic cavity is not renewed after the normal fashion."

Continuing quotations from McKenzie on obstructive deafness and nerve or perceptive deafness:

"Symptoms of eustachian obstruction, obstructive deafness, that is to say, with the indrawing of the tympanic membrane are the

7. Randall, B. A.: Ear, Americana, Vol. 8.

8. Ide, C. E.: Laryngoscope, 27: 23, 1920.

9. McKenzie, Dan: Diseases of the Throat, Nose and Ear, St. Louis, C. V. Mosby Company, 1923, p. 463.

effect of eustachian catarrh secondary to the turgid and swollen condition of the eustachian lips and walls, when adenoids are present. . . . It is perhaps the case also that the chronic catarrhal deafness of middle life is due to late secondary effects of the transitory attacks of nondischarging, acute catarrh of the middle ear of childhood. (page 381) . . . The conducting apparatus, interference with which causes obstructive deafness, comprises the external auditory meatus, the tympanic membrane, and the chain of ossicles (malleus, incus and stapes), the movements of which are incommoded by lesions, not only of the tympanic cavity, but also of the eustachian tube. When the hearing-tests manifest the characteristics of obstructive deafness, therefore, we know therefrom that the lesion must lie somewhere in these structures (page 395). . . . In nerve deafness, there is a pathological lowering of the upper tone-limit, while the low tones are still audible. In obstructive deafness, on the other hand, the deep tones are always lost, while the shrill tones are frequently, though not invariably, audible (page 400).

In discussing obstructive deafness, we find Politzer says (page 254): "The changes in the eustachian tube are also of importance in regard to the course of middle-ear catarrhs. Therefore, before going further we must lay stress on the fact that, even after the exudation has been completely removed from the ear, and a return of the hearing to normal function has occurred, a permanent cure cannot be expected as long as the permeability of the tube has not been established.

Ballenger[2] comments on the pathologic condition of the tube thus:

When, for any reason, the act of swallowing does not open the tube sufficiently to admit air into the tympanic cavity, the oxygen is absorbed from the contained air by the blood into the surrounding tissues, and a partial vacuum, or a negative pressure, results. The blood in the surrounding tissues is drawn to the parts by the negative pressure, and congestion results. The contained secretions undergo decomposition and irritate the lining mucous membrane. The hyperemia produces overnutrition. As a result of the combined irritation and increased nutrition, the mucous membrane becomes thickened, either by hypertrophy or hyperplasia. These secretions are not only retained in excessive quantity, but are changed in character. This condition is known as middle-ear or tubal catarrh.

Anything that obstructs the flow of secretions of the eustachian tube predisposes the mucous membrane of the tube and middle ear to infection and inflammation. The two great underlying principles relating to the etiology of inflammation of the mucous membrane lined cavities are: (A) The exciting cause of inflammation is almost always a pathogenic micro-organism. The micro-organism is powerless to grow upon healthy tissue, hence the second great underlying principle relates to the conditions which favor their growth. (B) The predisposing cause is usually an obstructive lesion interfering with drainage and ventilation of the cavity, thereby lowering the resistance of the tissues. The pathologic micro-organisms then flourish, and their toxins excite the reaction of inflammation.

It might be well to go over very briefly the defects of hearing due to affections of the middle ear and eustachian tube as listed by Ballenger. We will take those of the middle ear first: (*a*) simple catarrhal otitis media, which, according to Hovel, constitutes 13 per cent of all ear diseases; (*b*) catarrh with adhesions; (*c*) sclerosis of the mucous membrane; (*d*) cholesteotoma; (*e*) acute suppuration; (*f*) chronic suppuration; (*g*) ankylosis of the ossicles; (*h*) ankylosis of the foot plate of the stapes to the oval window; (*i*) adhesive bands uniting the ossicles to each other, to the walls of the tympanum and to the drumhead; (*j*) atrophic otitis media; (*k*) anemia of the mucosa occurring with general anemia and debility; (*l*) loss of tonicity of the stapedius and tensor tympani muscles; (*m*) congenital defects or absence of the middle ear; (*n*) granulations in the middle ear; (*o*) serous and mucous accumulations; (*p*) polypus; (*q*) caries of the ossicles; (*r*) caries of the walls of the tympanum; (*s*) rarefying osteitis or spongifying of the bony capsule around the oval window. According to both Ballenger and Lutert, central perforations of the tympanic membrane usually indicate inadequate drainage and ventilation of the eustachian tube.

In the foregoing conditions, we find the more common causes of deafness. The acoustic law, namely, that the con-

dition that disturbs the normal tension between the drumhead, the ossicles and the labyrinthine fluid will cause deafness, applies with special force to the affections mentioned in this section. All or nearly all of the pathologic lesions named materially interfere with the tension, and thereby interfere with the transmission, of the sound waves to the labyrinth. A study of these lesions will verify the law that, as a general thing, the deeper the lesion, the more profound the deafness.

Defects of hearing due to a pathologic condition of the eustachian tube are (*a*) catarrh; (*b*) fibrous thickening of the mucosa; (*c*) fibrous bands across the lumen of the tube; (*d*) fibrous rings or strictures of the tube; (*e*) lymphoid hypertrophy within the tube; (*f*) hypertrophy of the mucosa; (*g*) general sclerosis of the mucosa; and (*h*) paralysis of the palatine muscles that regulate the patency of the mouth of the tube.

The chief function of the eustachian tube being to maintain the equilibrium of air pressure between the air in the middle ear and that external to it, an obstruction of the normal passage of air destroys the equilibrium. The normal tension of the drumhead, the ossicles and the labyrinthine fluid is disturbed, and deafness and tinnitus result.

Since the normal patency of the tubes is controlled by the palatine muscles, any condition which affects their innervation or motility will cause defective hearing.

The foregoing has been compiled from our best authorities on anatomy and pathology. In going over these and many others, I can find no reference to loss of muscle tone and pressure displacement as a result of closed bite or shortened facial dimensions, except in the writings and teachings of Dr. Monson.[10] Nor is there reference to the fact that a closed bite displaces the tongue backward, thereby forcing the adjacent movable or soft parts into abnormal positions. This continued abnormal displacement of the soft parts of the nasopharynx must result in a marked pathologic condition. I believe this is particularly true with reference to the cartilaginous eustachian tube. Not only does the forcing back of the tongue displace the soft palate in a backward and upward direction, but also the soft palate and its attachments place great pressure on the pharyngeal opening of the eustachian tube, which lessens the patency of the cartilaginous portion of the tube itself. This pressure displacement must of necessity not only lessen the lumen of the tube but also lead to inflammation and other morbid conditions, and, in addition, doubtless causes atrophy of the palatine muscles through which it is controlled.

We also know that closure of the bite results in great loss of tone of the muscles of mastication that control the function of swallowing. This is an established fact.

Closure of the bite will cause a pathologic displacement of the cartilaginous eustachian tube and the muscles that control it and cause loss of tone in the muscles that have to do with the function of swallowing. The function of swallowing, when properly performed, accomplishes the ventilation of the middle ear, equalizing the air pressure on the tympanic membrane and assisting in the drainage of the tube, the middle ear and the mastoid cells.

With these facts before us, it seems most reasonable to assume that much of the disease of the middle ear and eustachian tube noted in this paper may be the result of closure of the bite or, possibly, in some cases, a lack of development of the teeth and jaws. The latter condition will often produce the same results as a bite that has been closed by loss of teeth, faulty dental operations or a gradual wearing down of the occlusal surfaces. I am of the opinion that these

10. Monson, G. S.: Impaired Function as a Result of Closed Bite, J.A.D.A., 8: 833 (Oct.) 1921; Case Histories, J.A.D.A. 11: 55 (Jan.) 1924.

conditions cause a great deal of tubal inflammation and tubal catarrh, which our best authorities claim is the cause of most middle ear disease. It is the abnormal collapse of the eustachian tube that is responsible for a large percentage of ear troubles. When drainage of any of the mucous lined cavities is interfered with, inflammation and catarrhal conditions are the result.

Many otologists are agreed on certain phases of diminished or lost hearing, commonly called "deafness of middle life." They find that the majority of these cases are accompanied by loss of tone of the eustachian tube, with its various resulting complications. Also they are agreed that very little of a definite nature is accomplished in the way of a permanent improvement in these cases. This so-called deafness of middle life would be better described as deafness of closed bite, for middle life is but coincidental.

I believe that Dr. Monson has found the cause of much of this trouble, and not only we of the dental profession but also all other specialists interested in this work and a great percentage of those patients afflicted with obstructive deafness have indeed reason to appreciate the results of his many years of scientific investigation.

By putting into practice the Monson spherical principle of occlusion, it is possible to estimate accurately the loss in facial dimensions (the amount the bite has closed) and to reestablish them and normal occlusion. This will allow the tongue to come up out of the throat, thereby relieving the pathologic pressure and also making possible normal function in swallowing. The eustachian tube will then be enabled to give better drainage to the parts it serves and to maintain atmospheric balance on the tympanic membrane. Provided there are no other contributing causes and that the pathologic condition is not too far advanced, much relief may be obtained by this restoration of the parts to normal position and function.

Add to these facts the many hundreds of cases that members of the Monson Research and Clinic Club have successfully treated by opening the bite to normal and balancing the occlusion, and there is no room for doubt as to the cause of many of these cases of pathologic conditions of the middle ear, and as little room to doubt the very scientific procedure in the correction of the same.

The following case histories are not selected from a group or a large number of operations, but are three consecutive cases of closed bite that I treated in Los Angeles last winter. I was assisted in two of them by Dr. Frank Fisher.

The ear tests submitted in the two cases of diminished hearing were not made in our offices but by two different otologists. I will not give the complete examinations made by these two doctors, which include general physical examinations, the Weber test, the Rinne test and others. The other functional tests harmonize with those of the acoumeter and watch.

REPORT OF CASES

CASE 1.—L.B.J., a man, aged 54, suffered from diminished hearing in both ears and acute pain in the left ear, which had been quite persistent for a period of more than two months. Examination revealed sufficient closure of the bite to cause all of the pathologic conditions noted. When the patient first came in, most of the upper teeth were present, but they were greatly abraded, and there was marked disease of the periodontal membrane. A partial lower denture was in place, substituting for the posterior teeth. The ear function tests were made, Feb. 22, 1924. All of the upper teeth and all but three of the lowers were extracted. New dentures were put in place, March 20, the bite being opened 7 mm.

Function tests made, February 22, with a number forty ear watch, revealed: right ear, 10 inches before inflation, 12 inches after inflation; left ear, 5 inches before inflation, 6 inches after inflation; whisper, 12 feet.

Tests made, May 5, revealed: right ear, 15 inches before inflation, 15 inches after inflation; left ear, 10 inches before inflation, 10 inches after inflation; whisper, 18 feet.

These tests revealed a gain in function of

50 per cent in the right ear and 100 per cent in the left ear with the ear watch, and a gain of 50 per cent with the whisper test. It also determined that inflation had no effect six weeks after the bite had been opened 7 mm., which, I believe, shows that the eustachian tube was in much better function, as inflation was, apparently, unnecessary. After the new dentures had been in use a short time, the severe pains in the left ear began to subside and there has been no recurrence of this pain whatever.

CASE 2.—M.S.F., a woman, aged 51, had suffered a marked loss of facial contour and had throat trouble. Partial deafness in the right ear dated from early childhood. The function of the left ear was normal. The loss of facial contour and throat trouble was diagnosed as due to closed bite. When the patient came in, March 12, 1924, full upper and partial lower dentures were in place. These dentures, which she had been using more than two years, allowed an opening of 13 mm. between the ridges in the anterior. New dentures were constructed, increasing this opening by 9 mm., or to a total of 22 mm. The four illustrations of this case (Fig. 5) shown herewith are from photographs made the morning the new dentures were placed in position. All four photographs were made at the same sitting. In the two full face views, you will note that, by increasing the facial dimensions 9 mm., the mouth, at once, appears less slitlike. The lips become fuller and not so wide, and even begin to assume the cupid's bow contour. The nose is beginning to narrow to something like normal and the characteristic chops are greatly reduced. The strained appearance produced by the muscles, owing to the reconstruction, almost entirely disappeared within two days, the soft tissues assuming a natural drape, made necessary by the new position of the mandible. The throat conditions improved, the patient stating that the first afternoon the new dentures were in place, she could actually feel her tongue coming up out of her throat.

In the illustrations (Fig. 5), the profile and full face to the left were made with the old dentures in place, and those to the right, with the new dentures in position. In observing these closely, you will note that, with the opening of the bite, the double chin completely disappeared and the so-called chops and character lines are greatly reduced. These deformities are generally considered a result of age coming on, but they are simply an indication or diagnostic sign that the bite is closing; for, as the bony framework gradually closes up, the soft tissues fold and sag, and with the restoration of the facial dimensions, the soft tissues resume their normal mold and restore the facial contour.

A B A B

Fig. 5 (Case 2).—Appearance of patient: A, with old dentures; B, with new dentures.

This was the only case of the three in which the patient experienced any discomfort. She complained of distinct distress in the temporomandibular articulation and muscles. This condition righted itself in a very few weeks.

CASE 3.—C.R., a woman, aged 46, suffered marked impairment of hearing in both ears, with noises in the ears and throat irritation. The patient was very irritable, registering a general slump in her attitude toward life in general. When she came in early in February, 1924, she had full upper and lower dentures that she had been using ten years. These allowed an opening of but 10 mm. between the ridges in the anterior. New dentures were placed, February 29, increasing the facial dimensions by an addition of 12 mm., giving a total anterior opening of 22 mm. Photographs were taken (Fig. 6) and ear tests made that day with both the old and new dentures in

place, at the same sittings. The full faces are not shown because of the wrong inclination of the head. The profile to the left is taken with the old dentures and the middle one with the new dentures, while the one to the right is with the new dentures just nineteen days later, March 19. You will notice the strain of the muscles, especially in the lips in the middle photograph, while in the third one the improvement in facial contour and muscle rest is as decided as it is apparent, natural curves and fulness of the lips showing the return to normal. The patient was instructed to wear the same gown and arrange her hair the same for this picture as the others. When questioned about this, she remarked "Why doctor, I couldn't look so plain as that again for I feel so much better and so much younger, I just had to fix up a little." That tells the story itself. The patient's increased brightness is apparent.

Fig. 6 (Case 3).—Appearance of patient: left, with old dentures; center, with dentures (first day); right, after wearing new dentures nineteen days.

Herewith are the tests made by the otologist.

February 29: Examination with old dentures, acoumeter test, left ear, 5 feet; with new dentures, acoumeter, left ear, 8 feet.

March 19: Acoumeter test, left ear, 12 feet; an immediate increase in hearing from 5 feet to 8 feet, and a total increase of from 5 feet to 12 feet in nineteen days, which is a total gain of 140 per cent. The right ear showed but little change. The otologist's tests were complete, and his summary was "The tests show that there is an apparently decided improvement in the left ear."

When the patient visited my office, March 19, she informed me that I did not have to shout at her any more, for the improvement in ear function for conversational purposes was much more marked than the acoumeter test indicated, which is frequently the case. The patient also informed me that the last four days she had been able to hear the family clock tick, and more plainly each day. This was something she had not been able to do for several years. In this case no discomfort whatever was experienced in the temporomandibular articulation.

To these three cases, I would like to add that of my own. For the past two years, it had been apparent to my family that my hearing was slipping a little as far as my left ear was concerned. Over a period of five months I had had other dentists make tests with my watch, and I also have made tests. The range of these was from 26 to 36 inches, never farther. My bite was closing up rapidly, owing to the loss of some teeth and abrasion. The mandible had also moved to the left considerably. April 12, 1924, Dr. L. L. Eckman, of St. Paul, placed on my lower teeth interocclusal splints that opened the bite 8 mm. and permitted the mandible to take its correct mesial relationship with the maxilla. In ten days, the same watch test for my left ear gave 10 feet, and now it is up to 15 feet and very nearly as keen as with the right ear. Along with ear function improvement, considerable throat irritation disappeared and also coughing up of phlegm in the mornings has ceased.

This simply is another illustration of the point that the crowding backward of the tongue into the throat is responsible for severe pathologic conditions.

I believe that before treatment of this character is instituted by the dentist, the

patient should be referred to an otologist for a thorough nasopharynx and eustachian tube examination, to find whether any contributing causes are present. If these exist, they should be removed, if possible.

It should hardly be necessary to add that, in all of these cases, along with the opening of the bite, the balancing of the occlusion brought the mandible forward, bringing the heads of the condyles from their retrusion upon the external auditory canal and also releasing the tongue from the throat and restoring normal tone to the muscles of mastication.

DISCUSSION

*Harry Morton, Milwaukee, Wis.:* Unusual research has been necessary in compiling the statistics here given us on physical disturbances in the auditory canal. We are face to face with this fact: our newer knowledge of the origin of degenerating processes in a large percentage lies in and around the oral cavity, and traumatism has been very largely dissociated from condyle articulation. In reviewing medical authorities on lesions found in or around the external, middle or inner ear, as given us by Dr. Smith, it is quite the general opinion of all that, whether the disturbances in the auditory passage is external or internal or the disturbance of functions is due to nerve or muscular impairment, the degenerative processes in many cases give a somewhat hopeless prognosis. In other words, all the authorities have called our attention in minute detail to the impairment of muscles and nerve fiber, and yet none of the authorities are giving sufficient attention to the causative factors other than the pathologic. If muscle control, as quoted by Rice, is a factor in degeneration of the tonicity of the apparatus of hearing or equalized air pressure is responsible for the perfect function of the tympanic membrane; if any interference of the normal tension between membrane and bony structure disturbs the function, as quoted by Ballinger, or nasopharyngeal catarrh causes a blocking of the eustachian tube by swellings and secretions, as quoted by McKenzie; if all of these things are true, we are still interested in the causative factors which brought about the aforementioned disturbances and none of the authorities have, to my mind, nor has Dr. Smith, emphasized sufficiently the possibility of dental interference being the factor in many and perhaps all of the symptoms aforementioned. Dr. Mayo, in an address at Milwaukee, October 29, before the Tri-State Medical Society, stated that 87 per cent of disease was of infectious origin and that a large percentage of this 87 per cent was found in and around teeth and tonsils. Therefore, it is reasonable to suppose that the pathologic process which may be found in and around this auditory passage is just as important as a degenerative factor as the pathologic process found around the root or roots of teeth, whether it be caused from trauma or from the death of tissue. Therefore, I wish to call your attention to the importance of the fact that the pathologic process, whether it be from the disturbed function of hearing or the disturbed function of mastication or digestion, is, if the pathologic process is present, cutting down the reserve carried in the blood. Weston A. Price, of Cleveland, has illustrated the medical and physiologic picture of the blood in its relation to normal and abnormal health, and we are now finding that the pathologic condition, be it in the teeth, the tonsils, the sinuses or the maxillary mandibular articulation, pulls down the reserve of the blood; and while Dr. Smith has illustrated the functions that are disturbed, I would emphasize more particularly the pathologic process generated, which is the factor in reducing the individual's reserve. Let us consider three types of men in middle life and well developed, all of whom have lost an abnormal amount of tooth structure, with consequent disturbance in the maxillary mandibular articulation. In one case, which we will call A, this disturbance in the condyle articulation is the only physical manifestation of discomfort, and a physical examination reveals that these symptoms of disturbance are the only unfavorable symptoms which this individual has. On the other hand, B, with the same amount of tooth destruction and the same amount of mandibular disturbance has no symptoms of disturbance in or around the auditory passages. Therefore, we must bear in mind that all individuals who have lost tooth dimension or have had a disturbance in the condyle articulation are not prone to develop the same symptoms. An individual who from youth had suffered from nondevelopment of the mandible, with a retrusive inclination, would undoubtedly have a compensating readjustment of the condyle articulation from early youth to adult life, and this early compensating equalization of pressure would prevent the development of pathologic conditions that might result if the disturbances had taken place more suddenly and at middle adult age. This would be illustrated in case C. In going back to case A, in which the only manifestations are pain around the condyle head with loss of hearing, the occlusion has been shortened 4.5 mm. This shortening was on the surface of every tooth equally, and the excessive pressure in the condyle region did not come about until all of the enamel surface had been removed

so that the last 2 mm. of shortening came about very quickly, and there could not be a compensating accommodation in the condyle articulation. Trauma resulted with the pathologic conditions that come with it, and it might be interesting to note in this particular case that a blood analysis made in the usual way was negative, and yet when a chemical and a morphologic analysis was made by Dr. Price, the alkaline reserve was cut from index 45 to 34.5, the calcium index from 10.5 to 9.4 and the phosphorus index from 10 to 9, showing definitely that the pathologic condition existent for a year and one-half had begun to break down this man's reserve. Incidentally, it might be said that these two phenomena, the shortening of the dimension of the teeth and the accompanying trauma, had partially devitalized some teeth, which no doubt was due to the influx of calcium into the pulp tissue as a part of the defense mechanism. Therefore, with Dr. Monson's theories of occlusion, it is most interesting to note the number of cases met in our practice in which a pathologic condition of the middle ear has already developed with a relative shortening of the tooth structure accompanying it. There is not the slightest doubt in my mind or in the mind of Dr. Smith that the largest percentage of deafness, irrespective of the type of functional impairment, is due to the destruction of the articulating surface of the teeth and a misplacement of the condyles in relation to their glenoid cavity.

The interesting factor to me lies in the field of prevention. If we can anticipate in youth the general trend of the mandible, we can assist nature in developing it by bringing the teeth to a vertical position. If we could retain the cusp forms and early recognize these important factors, much of our impaired hearing could be prevented. I believe we can serve this Association by a closer classification of the mouths wherein disturbances are taking place, as there seem to be individuals in whom the manifestations are rather sudden in their appearance, usually in middle adult life rather than in youth, and accompanying the rapid destruction of tooth surfaces. In other words, the articulating structure in the maxillary mandibular articulation cannot accommodate itself so rapidly as the tooth surface is destroyed. I am making a checkup of many of these cases in which individuals seem to be in perfect health and yet just such pathologic factors as Dr. Smith has called attention to are the first evidence of the break of that individual's reserve. It is for the dental profession to keep a watchful eye so that they may take an active part in preventing this index being broken.

*Dr. Smith, closing:* Dr. Morton has drawn attention to the fact, that there is a gradual shortening of the facial dimensions, but that at a certain period, frequently about 45 to 50 years of age, the occlusion "hits the toboggan slide" and in two years great deformity develops. In Dr. Mayo's lecture he drew attention to the fact that usually at or about these ages, man's reserve started to break. It is the dangerous age. I am positive these two conditions are very closely related. The occlusion does not need to be built up and balanced for the sole purpose of making a good masticatory apparatus, nor for the mere sake of relieving throat troubles, nor to correct or hold ear conditions from becoming worse; nor yet with the single idea of facial balance and beauty, but also for keeping intact the mental as well as the physical reserve.

Another point should be brought out more clearly: During the last few years, papers by Monson, Wright, myself and others have been published relative to deafness being produced by trauma caused by condyle encroachment. I am definitely of the opinion that most pathologic conditions of the ear caused by closed bite are due to the displacement of the tongue and other abnormal positions of the other soft tissues of the mouth, throat and neck, although doubtless condyle encroachment is a large factor as well.

It would appear that we are just at the dawn of great things; of a new era in dentistry and medicine, with the dental occlusion as the awakening factor.

I have drawn attention to this before and am more convinced every day, of the important part it plays in the human wreckage we continually see.

# THE QUESTION OF SPEED IN ORTHODONTIC TREATMENT

By JAMES DAVID McCOY, M.S., D.D.S., F.A.C.D., Los Angeles, California

(Read before the American Dental Association, Dallas, Texas, November 10-14, 1924)

THE length of time required for treating the common types of malocclusion is a matter of interest and a subject of considerable debate among orthodontists. From some quarters, we hear the claim that a period of a few weeks or a few months should suffice for such cases, and from this same source there emanates the most violent criticism of those not following this plan, who refuse to accept it as logical and for the best interests of orthodontic patients. Also, from this same source are spread stories of cases whose treatment is reported as having consumed two, three or five years, with the assertion that such long periods are unnecessary and detrimental. Like any other branch of the healing art, orthodontia has its share of faddists; and, when any of these in positions of prominence report their diverging views to the profession through some forceful medium of publicity, the result is most confusing to the rank and file of practitioners.

Any satisfactory solution of this problem must have for its foundation a correct conception of what is entailed in orthodontic treatment and what must be accomplished by it. In attempting to establish such a foundation for further discussion, I find it necessary to alter in some degree the idea most prevalent with dentists as to what constitutes orthodontic treatment. A grievous misconception of this task has been created, for the most part by the wide publicity given certain types of appliances by their inventors and manufacturers. In an effort to create a sales demand, many ridiculous and misleading claims have been made and are still being made in advertisements appearing in some of our journals. The basic thought that these advertisements, as well as other sources of propaganda, carry to the minds of those eager for orthodontic information is that the mechanical movement of the teeth into correct occlusal relationship and their subsequent support in this relationship through a period called retention constitutes orthodontic treatment. To the unschooled mind or the mind actuated by commercial motives, such ideas are doubtless received with satisfaction. The formula is followed with confidence and zeal, with the result that all too frequently black pages are added to the orthodontic record.

The question of what really constitutes orthodontic treatment is the important one for us to determine; for, on the answer will depend to a large degree what we can consider a reasonable period of time for this process. At the outset, regardless of what ideas we hold, we can all agree that the orthodontic problem is concerned chiefly with growth and development; that the changes that occur during the movement of the teeth in the structures adjacent to them, as well as in the muscular environment of these parts, are dependent

on certain physiologic and ecologic factors inherent in the tissues themselves. Furthermore, we can all agree that, when the teeth are established in their normal relationship, changes occur within the structures that are just as important as those that characterize actual tooth movement. With the realization that early treatment has decided advantages, the average patient of today comes to us with a mixed dentition. This means that either during the primary stages of orthodontic treatment, but more frequently after it, certain groups of teeth must be shed and replaced by their permanent successors before the completion of masticatory apparatus is realized. In the building of this complex organism, Nature does not send the teeth rushing through the tissues, nor does she attempt to complete it within a few months. What is the logic, then, of forcing groups of malocclucling teeth into correct relationship and then waiting for months and sometimes years for subsequently erupting teeth to take their positions? Why make the first period of treatment a matter of haste and near violence, when such patients must be required to wear appliances of some sort for indefinite periods for the secondary treatment? Is there not a happy medium between the extremes of violent tooth movement and the snail's pace variety?

The question of diagnosis, which, in reality, is the first and most important phase of treatment, is frequently overlooked, or, if it is not wholly so, is concerned chiefly in selecting the type of appliance that is to be used for moving the teeth. How much thought is given to a study of the character and degree of abnormality present? How much consideration and study is given to the causes responsible for the deformation, and whether or not they are still in operation? Only a few words are consumed in asking this last question, but on its solution depends the success of treatment. Doubtless, we can all outline the changes necessary to restore the teeth, arches and jaws to their normal relationship; but unless the question of etiology has been solved or encouraging progress made toward this end, why go to the trouble of making a correction? The statement that the causes of malocclusion are all to be found within the mouth or in causes directly related to occlusal function is a ridiculous assumption in spite of the fact that it offers much comfort to those who practice orthodontia by formula. When once uncovered, the correction of the cause of malocclusion immediately becomes an important phase of treatment, which preferably should antedate tooth movement.

Orthodontic treatment, then, may be defined as that process in which the character and degree of abnormality are determined; the causes responsible for it uncovered and corrected, and those changes necessary to restore the parts to normal brought about; and the normal functional relationship of the teeth, jaws and their related muscles is established. These accomplishments should constitute what we may designate as primary orthodontic treatment; for, following them, changes of equal importance to the final success of our work must occur. Heretofore, this secondary period has been referred to as retention; but in view of the fact that the teeth and dental arches are not fixed units after tooth movement, but, like any other assemblage of structure, are subject to those modifications and changes that occur during growth and development, this phase of the work appears to us in a new light, and should be considered a part of treatment. Care during this stage of treatment is just as important as when malocclucling teeth are being actively moved, and the effect and value of appliances are, in many instances, no less important than in the former period.

The period of time required for either primary or secondary treatment is dependent on several factors not related

directly to appliances. Of these, the age of the patient is of great importance; for the teeth of young and growing children can be moved more expeditiously than during the period of adolescence or near maturity, because the adjacent tissues react more readily to the stimulus of pressure. Furthermore, the "growing process" of the dental arches and jaws is receiving that impetus which comes from developing teeth, with their inherent tendency toward eruption and the resultant added bone development which must be created to support them. What we might term "tissue tolerance" to appliances is greater in young children, owing no doubt, to the generous blood supply with which these parts are favored during the changes that characterize active growth. However, in spite of what we have designated as "tissue tolerance," there is important evidence that rapidly moved deciduous teeth or deciduous teeth subjected to abuse during movement are prematurely lost, a fact which in itself should make us stop and wonder whether or not we should not be more cautious in moving permanent teeth.

Let us suppose that, in the treatment of the majority of our patients of favorable orthodontic age, in whom the correction involves the restoration of normal arch form and relationship, we move the teeth gently into their normal positions and relations, and let us assume, for argument's sake, that this has consumed a period of from six to ten months. Let us assume that there are still from ten to twelve deciduous teeth to be shed, and at least an equal number of permanent successors to take their places. When may we say that primary orthodontic treatment is complete and secondary treatment commences? Are these deciduous teeth always shed on schedule and do their successors always follow in an orderly manner? Most certainly they do not; and frequently we are confronted with delays that run into months and years. Should the care of such patients during this period rest upon the shoulders of the orthodontist or should these patients be turned loose with a removable retainer in place with the assurance given that treatment has been completed? With fairminded men, the answer to this question could not long be in doubt; for, until a patient can be released from the restraint of all appliances, he is certainly not to be classed otherwise than under treatment.

In addition to the ordinary delays that occur while waiting for permanent teeth to erupt, we all too frequently come in contact with children whose mouths are unusually erratic and abnormal in this particular. This may mean that, instead of a few months, a period of years may elapse before some particular tooth or group of teeth appear. The reason for such delay is not known to us, but may have its origin in some disturbance of metabolism resulting from lack of endocrine balance, or in some other equally vague condition. Of course, such cases are somewhat of a rarity, but when they do occur, the orthodontist who is unfortunate enough to have them is frequently maligned for dragging his work out indefinitely. In other words, his efforts in protecting his patients' best interests frequently meet with criticism instead of appreciation.

Other excusable delays may be occasioned by interrupted treatment due to illness, travel or boarding school attendance; or, last but by no means least, a lack of cooperation on the part of the patient. These excusable delays are mentioned because there are undoubtedly cases that, through sheer incompetence on the part of the operator, are prolonged needlessly. The work in such cases, however, is not characterized by slow tooth movement, but rather by no tooth movement. Even malocclusing teeth which are carried at a snail's pace must eventually reach their destination; but when the operator behind the appliance is entirely lacking in a fundamental knowledge of its operation, a case is

liable to start nowhere and get nowhere. The class of operators who fall in this category are not to be numbered among those using some special type of appliance, but are to be found using both the patented and nonpatented variety.

From a prominent sectarian group of orthodontists, misinformation is being broadcast in favor of rapid treatment, the inference being made that, through the magic influence of a certain patented appliance, physiologic tooth movement occurs, and, as a result, treatment is terminated in a period ranging from a few weeks to a few months. According to their plan, after this period of treatment, a removable appliance is placed in the mouth to be worn for an indefinite period. This indefinite period is not included in the time of treatment, notwithstanding the fact that an appliance is necessary, but is covered by "retention."

How far has the promulgation of such ideas gone toward correcting real basic faults in our orthodontic knowledge? May we not ask what motive lies back of this propaganda? It is well to remember that the question of slow or rapid treatment is in reality not a new discussion in orthodontia, as will be apparent to those who have read orthodontic history. Has its present revival some ulterior motive? Would we be vulgar to suspect that this agitation has for its object the sale of patented appliances? Can it be construed as having value as "sales talk" to dentists and patients alike, "treatment completed in a few months?" Then let us ask, is it the truth? Are cases completed simply because malocluding teeth are moved into their supposedly correct relationship?

If it were possible for any teacher or manufacturer to reduce orthodontic treatment to a simple formula so that it could be literally dispensed in packages, how marvelous it would be! Whether this shall ever occur or not may be answered by a survey of any other branch of the healing art, noting whether or not this has occurred elsewhere. That orthodontia has not been reduced to an exact science is apparent from the fact that all too frequently relapses occur after treatment, showing that either the original cause has not been removed, or, in the movement of the teeth, the tissues have been abused to the extent that they are lacking in the vitality essential to carry through the process of adaptation to their new environment.

One well-known teacher of orthodontia has expressed the opinion that the rate at which teeth should be moved may be judged by the time it takes an erupting tooth to travel from the gingiva to the occlusal plane. Why this particular period of tooth eruption should be selected as the index of speed for tooth movement was not made plain; but we might wonder why the distance from the gingiva to the occlusal plane is selected. Erupting teeth start moving far earlier than this period. Why not let us judge the speed for tooth movement by the time it takes a developing tooth to progress from its earliest formation until it is fully erupted and in place? Would not one assumption be just as logical as the other?

The rapid movement of teeth is no act of magic; nor is the possibility for such a circumstance limited to any one appliance. The question we should consider is how rapidly we can move teeth and still maintain that favorable degree of balance within the structures surrounding them which will bring about the best results. In our endeavor to fulfil this requirement, we always have one sign that offers us some degree of guidance, and that is the question of pain. We should bear in mind, however, that an inflammatory process may be in progress to some degree, and still the symptom of pain be absent. In orthodontic tooth movement, especially in young children, the degree of tissue tolerance is great; but this should in no wise justify us in utilizing abusive measures.

In the memorable experiments of

Oppenheim, the character of force best adapted to bring about the necessary bone changes for favorable tooth movement were amply demonstrated. In an equally forceful and unmistakable manner, the results of violent tooth movement were shown. Has anyone since that time brought forth evidence as conclusive or have they submitted even the semblance of proof that Oppenheim's conclusions were incorrect? Has not the clinical experience of nearly every careful practitioner proved that Oppenheim was right? These are facts to which we can well give our thoughts, and when the evidence is all in and the facts are thoroughly analyzed, I believe we will continue to move teeth gently during the period of primary treatment; and to give them watchful care and attention during the secondary period of treatment, and will, in both instances, refuse to join any movement that bears the semblance of a speed contest.

## CONCLUSIONS

1. The misconception as to what constitutes orthodontic treatment is responsible for the mishandling of many cases, with resultant failures; which tends to put orthodontia in disrepute.

2. A conspicuous factor in confusing and misinforming those eager for orthodontic information is to be found in many of the advertisements appearing in our dental journals, as well as the propaganda which supports them.

3. Orthodontic treatment must not only include the restoration of the teeth, dental arches, jaws and their muscular environment, to their normal relationship and function, but must be preceded by a diagnosis that includes an intelligent study of the cause or causes responsible.

4. When the cause or causes cannot be uncovered or encouraging progress made toward this end, treatment should not be undertaken.

5. The elapsed time necessary for treatment depends primarily on what must be accomplished. This is further conditioned by the age of the patient; the degree of cooperation given, and the progress of those physiologic processes attendant on growth changes and whether they follow in an orderly manner.

6. The time spent for treatment should not be judged merely by the period required for active tooth movement, for this comprises primary treatment only.

7. During secondary treatment, changes of such vital importance usually occur that, in spite of the fact that appliances may be reduced to the minimum of simplicity, and their manner of operation changed; responsibility for the care of cases during this period is just as great as during the former period.

8. Prolonged secondary treatment may be occasioned by the erratic and abnormal eruption of teeth whose presence is essential to complete treatment. Such instances should not be confused with the work of incompetent dentists who "start nowhere and get nowhere" with their work.

9. Propaganda being broadcast in favor of rapid treatment in which claims are made that cases are completed in a few weeks, or at most a few months, is misleading, and its proponents are laying themselves open to the suspicion of lending themselves to a movement to create a sales demand for certain patented appliances.

10. During primary orthodontic treatment, teeth should be gently and unalteringly moved into their correct relationship; but to tax the tissues to their limit of toleration is not in keeping with the best and most authoritative findings relating to this phase of treatment.

11. In safeguarding the patient's interests, it frequently becomes necessary to spend far longer periods in treatment than preliminary surveys indicate; but when such exigencies arise, our obligations do not cease until we have done everything humanly possible to insure ultimate success.

DISCUSSION

*B. Frank Gray, San Francisco, Calif.:* There are instances, as we all know, when the correction of malocclusion of the teeth may be properly accomplished in a relatively short period of time. However, before an estimate of the time required for orthodontic procedures in general can even be approximated, the operator needs to understand what properly constitutes orthodontic treatment. Certainly, if it contemplates merely the placing of the teeth in a relatively good relation, with the dismissal of the patient, possibly with instructions to wear some form of removable retaining plate in the maxillary arch, we could, on any such basis as that, "speed up" our work to a tremendous extent. Fortunately for our patients, we do not appraise our responsibilities so lightly. How about the idiosyncrasies of patients, an outstanding example of which is recognized in two approximately similar cases of malocclusion wherein one patient responds promptly and satisfactorily to treatment, while the treatment of the other may, with our best efforts, require twice as long. How about perverted muscular function? Do the speed enthusiasts cure this in the few weeks the patient is in their care?

Those most experienced in dealing with these problems find in many cases that the establishment of anything like normal balance and function of the organs and tissues involved cannot be assured in a brief few weeks or months. In view of the very great number of contingencies that may affect the various cases coming under our observation, how foolish it is to put out at random these claims of extraordinarily rapid treatment, misleading as they are to the general practitioner and to the novice in orthodontia. It is almost on a par with the advocation of extraction as a corrective measure. Even if it ever were justifiable in rare instances, would it not be a harmful doctrine to publish?

We can agree that, in the attempt to treat too great a number of patients, the operator cannot give adequate attention to any of them, and thus the work is unduly extended.

Dr. McCoy's presentation should serve a most useful purpose in assisting those not experienced in orthodontic practice, to a proper appraisal of the matters of which he has written.

*Harry P. Stallard, San Diego, Calif.:* It is the purpose of the orthodontist to prevent and correct malocclusions, permanent results being his sole aim. Speed of treatment, alone, does not gage the efficiency or the proficiency of an operator or the value of the appliance used; yet the time factor enters into everything done. An orthodontist is compelled by the economic and psychologic factors touching the patient and himself to treat as rapidly as he can. The unavoidable harm, that any active or retaining appliances do to the tissues of the denture also suggests the necessity of shortening the period of treatment, but, unless the treatment yield permanent, beneficial results, it is a failure.

If we knew more facts about orthodontia, we could discuss this phase of treatment much more intelligently; but, at present, we are relying too much on prejudices and guesses reaching us from all sources, and we are not certain of a single phase of treatment. We know little about causes of malocclusion, and therefore, nothing about correct treatment of some of the most common forms of malocclusion, nothing helpful about physiologic retention, and nothing certain about the prognosis or termination of treatment. I am led to conclude that the idealism boasted of in orthodontia is false; for we cannot have idealism unless it is based upon knowledge. Idealism based upon prejudices and unproved dogmas can be nothing but fanaticism.

Just how fast a tooth can be safely moved no one knows. We have had many gages suggested, chief among which has been pain; but we have no way of determining accurately the intensity of pain and cannot ascertain any definite relation between it and the amount of force applied. Pain varies in different children and from day to day in the same child, so that irreparable harm can be done painlessly by careless applications of force. I refer to denudation of the roots of the teeth.

It was once supposed that looseness may be used as a gage; but looseness of a tooth may result from causes other than speed, as the alternation between the forces of a habit and of the appliance, or from intermittent forces, or pathologic factors. Recently, it has been claimed, as Dr. McCoy has pointed out, that the rate at which teeth erupt is a guide. No one knows what the normal rate of eruption is. My observations convince me that it is comparatively slow, and if I depended on it as a guide, I would actively treat many simple cases much longer than I do now, and my work is no more painful than that of many who work less rapidly. With an experienced orthodontist retention is a serious problem, and yet he has no idea how long it must continue. I believe that the vagueness of the principles of retention and the tendency of some to slight retention are due to our small knowledge concerning it.

It has been said that we may judge the speed at which we should move teeth by the health of the gums; but inflammation may be caused by improper brushing or the lack of it, or by other mechanical and chemical factors attending the presence of appliances.

I am satisfied, by faith only, that permanent

results may be had only by removing prevailing causes, followed by preventing the development of bad tongue and lip habits during treatment; by treating the malocclusion carefully, thoroughly and rationally (correcting the actual deformations in the jaws as well as in the alveolar processes); by retaining all the normal teeth or maintaining spaces of absent teeth, and by careful mechanical and physiologic retention. And I believe that much less time is necessary than we are now using, even if we used the old simple appliances in vogue twenty years ago. I wish we had more knowledge of what constitutes rational treatment; but we are learning so much about orthodontia that we are convinced that we are not absolutely certain of any of our old claims, and it behooves us to be charitable.

Perhaps orthodontists have taken too seriously their interest in bone formation. Some orthodontists style themselves directors of osteoclastic and osteoblastic actions. Nearly every time an appliance is brought out, much is said about bone development; but we know little about the bony malformation accompanying malocclusion, and we Angle students are laboring under the illusion that the bony deformities of the jaws are results of malocclusion. May not the jaw deformity be a concomitant of the malocclusion—a companion result of the same causes? The first conclusion of Oppenheim implies that failure in orthodontic treatment is due to bone injury from treatment. I think his conclusion is based upon the conception that bone development of a certain strain is the real aim of an orthodontist. It seems to me that if we were more concerned about the soft tissues and the powerful forces causing malocclusion, bone development would take care of itself, if we instituted proper treatment. We know that bone is a passive tissue and depends much on soft tissues for its formation, health and development.

Oppenheim's second conclusion is an implication that the length of the retention time is related to bone formation, and he extends the hope that, if we treat slowly enough, we may shorten the retention period. I cannot believe that. Oppenheim assumes that, in treatment, we must move teeth gently and slowly by a delicate force in order to have proper bone formation, which, he believes, will retain them in their new positions. Are we to infer that the bone surrounding malocculded teeth differs inherently from any other bone? And are we sure that bone development, induced by careful orthodontic movements, with retention until the bone spicules adjust themselves to the functional forces, is more fixed in its nature than bone development around malposed teeth? Apparently, Oppenheim believed that teeth tended to return to their former positions on account of the elasticity of bone. This may be partly true; but in every case of relapse, that I have seen, it has been connected with persisting etiologic factors; and the only successes that I have seen occurred in cases in which the causes have been removed. I have seen cases in which the teeth, after being retained for years, maintained their corrected positions a year or more, and then relapsed very much in three or four months. Relapses are usually rapid, sometimes faster than corrective movements.

In his final conclusion, Oppenheim states that "the theoretical proof of retention has gained its foundation by" his "investigations." He says, "We must retain so long until the bone concerned is functionally orientated again under the influence of the normal function." This has been taken as the gospel truth, and I have known orthodontists who tried to find out when to quit retention by examining the alveolar processes roentgenographically. Of course, their results were negative, because all such ideas are based upon the assumption that malocclusion is due to a spontaneous lack of development. Oppenheim did his work and based his conclusions upon the assumption that malocclusion is the result of a lack of bone development, and that the causes have subsided when the patient comes in; or else he must have assumed that the malocclusion is due somewhat to perverted occlusal forces. When you stop and think about it, you will conclude that bone formation can never be any criterion of retention, because, if we can move teeth through bone by delicate forces, why can't etiologic forces undo all our work after we have removed the retainers?

I am not belittling the work of Oppenheim. It was one of the finest pieces of work ever done in orthodontia; yet has it not occurred to you, Dr. McCoy, that his conclusions were accommodated to the ideas promulgated in references to a working retainer, which exerts gentle forces at the apices of the roots? I ask you, in all fairness to the future welfare of orthodontia, did not the same inventor of appliances stand back of and help fashion these conclusions? There is no science to which we can turn for help in orthodontic retention because we have not worked out the etiology of malocclusion, and, until we do, treatment of malocclusion will remain empiric, and we will continue to see it through the possibilities of appliances. We are all influenced by the limitations of our appliances.

If we are to become scientific orthodontists, we must divorce ourselves from the prejudices caused by manufacture and profits of appliances, free ourselves from the dogmas of our textbooks and teachers and solve the problems

by a thorough study of the specific environment of the face and its reaction to all its factors of growth.

*Frederick B. Noyes, Chicago, Ill.:* Nothing in the world means so much to me as the development of orthodontia. For more than thirty years, I have given in large part my working time to the study of problems in orthodontia, and nothing in the way of veiled criticism will help the development of such a science. The ultimate problem of the orthodontist in almost every case of malocclusion is the establishment of a reasonably normal balance of function. Orthodontia is not simply a question of appliances; it is not a question of moving teeth; it is not a question of retention; it is a question of balance of function. You may lay down the thesis that teeth remain only in the position in which all the forces to which they are subjected are balanced. You may take a perfectly normal occlusion in the mouth of a man 40 or 45 years of age, and produce a disturbance in the balance of function, and his teeth will all move. We have forgotten too often that, during the whole period of development, the teeth are moving under the influence of all the forces to which they are subjected. We have forgotten too often that, in a case of malocclusion of approaching adult age, the teeth are in the position in which, under the conditions, the forces are balanced. In other words, Nature has worked out a position of stability. If we move those teeth without considering whether in their new position they will be in a state of balance or not, regardless of any cusp relation, regardless of any other factor, they will not remain in the position in which you leave them. We have too often forgotten that through the whole period of life the positions of the teeth even in the normal denture are not stable. They are moving, and, if the forces to which they are responding are in balance, they remain in normal relation.

Now, aside from that, there is nothing that I would like to help more than the practice of orthodontia, and as I look at the specialty over the entire country today I think I am justified in saying that the greatest crime that is being committed against children is the wearing of appliances for periods of time that are beyond all reason. I know, in my own experience, that the time required for certain things has been greatly reduced. I know, in my own experience, in many instances, appliances were worn for weeks and months in which they were doing nothing. They were an imposition on the individual. If an appliance is not working, it has no business to be on the teeth. From a study of the war surgery, I was impressed with one thing: the surgeons in those terrible cases, in many instances rebuilt an entire mandible from a few little pieces in a shorter time than a great many patients wear orthodontic appliances to move a few teeth a few millimeters. That struck home in my consciousness. I was convinced that if we knew what we wanted to do in the way of tooth movement and if we used technical means that were working constantly, the time to move teeth a few millimeters ought not to be stretched into years. On the other hand, orthodontia is concerned primarily with the development of as nearly perfect a human denture as possible. Growth is rythmic, whether it is animal growth or plant growth. It is not continuous. I have followed pretty carefully for many years now the growth in height and weight of children from 6 to 14 years of age, and they do not grow continuously in height and weight. There are periods of active growth, and then a standstill—a recovering of resources, and then another period of growth. The same proposition is true in the development of a denture. Anyone who has carefully noted the loss of temporary teeth and the substitution of their permanent successors must have been impressed with the fact that a tooth will apparently remain in the same relation for weeks and perhaps months, and then suddenly will advance rapidly to a certain point and stop, and not change again for weeks. There is in the eruption of the teeth, apparently, a repetition of a periodic process in life. Many years ago, I became convinced that it was a mistake to attempt to force development in the region in which I was interested, at a time when Nature was in a period of recuperation: that success and rapidity of movement depended on picking the time, which cannot be laid down by any rule of a calendar.

Dr. McCoy, very wisely and well, called attention to what he spoke of as "tissue tolerance." You might call it again, Dr. McCoy, tissue reaction. I think no careful student in the practice of orthodontia can have failed to notice that tissues vary tremendously. I can recall a good illustration. In the month of May, many years ago, two cases were presented in my office of exactly the same type of malocclusion and calling for the same tooth movement. One was in a boy, 14 years of age, the other in a woman, 22. The same type of appliances, the same sources of force, the same technic were applied in both cases. In three months, all the tooth movement was accomplished, in one case; and I could not see that the slightest movement had been made in the other case. You may imagine it was the 14 year old patient for whom the tooth movement had been accomplished. It was not. In the 22-year-old patient, the movement was completed, and in the 14-year-old patient, I could not see there had been the slightest re-

action, although the force had been increased carefully, cautiously, so that the patient was receiving at the same time a much greater amount of pressure than the other patient. There was, in the former case, the greatest resistance to tissue reaction that I have ever experienced. What is back of those conditions, I do not know; and no one has practiced orthodontia long without finding these differences.

I believe there are few things in dental science that are more complicated than orthodontia, and is it not fair to think that we have seen and will continue to see only a part of the picture, that it will be many, many years before by the most strenuous, continuous, honest effort, that we will pick up one after another the factors that are involved? We have been ready to pick up one thought and ascribe to that thought the whole of the means. I was impressed with that as Dr. Stallard referred to the work of Oppenheim. I want to pay my personal tribute to that work and its character. I believe that, like some other items in science, it will remain a classic, and fundamentally correct; that it will be modified, that it will be extended that it may be retracted in certain lines is just as inevitable as that any fundamental classic piece of work in any science will, in the light of every new item, impel a new point of view. To a certain extent, at the time when Oppenheim's work was published, the men that were thinking most carefully on the subject of orthodontia thought of the rebuilt bone as that which retained the teeth in their positions. Dr. Stallard made that very clear, but is it not just as certain that that bone which has been built under the influence of artificial mechanical appliances, however it is built, will react to the disturbance of balance of forces just as certainly as it responded to the disturbance of the balance of force produced by an artificial mechanical influence? If, when those appliances are removed, the forces to which the teeth are subjected are not in balance, no kind of bone that can ever be built will retain them. I said that the ultimate problem of the orthodontist was the study of function and the establishment of a reasonably normal balance of function. I believe, therefore, that the use of what we have all employed and still employ, namely removable retainers, would be gradually reduced and more and more come to be discarded. The principle which should be inaugurated and stated as forcefully as possible is that the teeth should be moved as expeditiously as possible, that the period of retention should be as short as possible, and then, that the dependence should be made not on a retainer but on the study of function; that those teeth should be let alone without retainers, for two reasons: in order that you may have function without disturbance and that you may study the deficiency in function as indicated by the reaction of the teeth. You may lay down the principle that, if those teeth were placed in their right relation and the functions were in balance, they would all move in their normal directions, and you can study the deficiency in function with any possibility of its correction only by leaving the consequences of function to observation. I believe, then, that those forms of retention which come into use between periods of active treatment will more and more be limited to devices that prevent the normal forces of development from being exerted in abnormal directions, and less and less for the purpose of substituting a mechanical support to supplement a deficiency of function.

Finally, I want to repeat that the interest of orthodontia, the honor of dentistry, the regard for humankind, and especially for little children, demands that men should cease to place appliances that are useless, that are inefficient, and that will not work on the teeth of children. Such things are a disgrace to a thinking profession.

*Dr. McCoy (closing):* One thing is apparent: the problem involved in orthodontic treatment is far greater than popular opinion would have it. The mere mechanical movement of the teeth into their correct occlusal relations is but one phase of treatment, and the care of cases beyond this point is a matter of great importance and should be also classed as "treatment."

# SURGICAL PREPARATION OF MOUTHS FOR DENTURES

By JAMES A. BLUE, D.D.S., Birmingham, Alabama

(Read before the American Dental Association, Dallas, Texas, November 10-14, 1924)

A DECADE ago, little attention was paid to full denture prosthesis, and practically none to the surgical preparation of mouths to receive the dentures. When the dentist was called to extract all the teeth, if a few roots were broken, he left them, thinking they would do no harm, and instructed the patient to wait six months or more and let Nature take its course. And Nature was kind. In from six to twelve months, she has made very good preparation in many cases as far as the arches were concerned; but who, in these modern times with so much to live for, wants to stay in retirement for such a length of time waiting for Nature to do the work that can be done by the oral surgeon at once; losing the expression, and letting the face become wrinkled beyond repair?

Modern denture construction demands surgical intervention—surgery of a high order, with the operator keeping ever in mind the finished arches; and the keynote of his thought should be conservation, surgical conservation. The question is not how much bone can be cut away, but how much can be saved and, at the same time, an arch be produced that will retain a denture. And the word retain is literal because, by the use of proper surgery, an arch can be shaped so that it is retentive in form; while, on the other hand, it can be easily spoiled by poor surgery. A V-shaped arch should be left V-shaped, and a square arch should be left square. All undercuts should be eliminated, except in the anterior maxilla, which should be shaped so that there is a slight and graceful undercut from cuspid to cuspid. Slight undercuts on the posterior lingual surface of the mandible are desirable. Just enough bone is removed to produce an oval ridge. The ridge should, in no case, be left sharp, as sharp bone under the mucoperiosteum will produce as much irritation as sharp margins of dentures. A low, flat ridge is to be preferred to a high, sharp one.

It is my practice to prepare one arch at a sitting, the anesthetic of choice being procain, administered by the combination infiltration and block method, although there is no objection to a general anesthetic if the operator prefers it. It is my opinion that a more careful and scientific preparation can be made, when the cooperation of the patient and freer access to the mouth can be had, than is possible under a general anesthetic.

A complete set of properly made roentgenograms is desirable as the relative density of the bone may be determined as well as the presence of diseased areas, such as those caused by periodontoclasia, cysts or granulomas. Where large cysts and granulomas exist, a careful operative technic will eliminate them with a minimum destruction of the alveolus. Periodontal lesions leave large crevices in the alveolus, and after the teeth are removed, very sharp and jagged

bone remains, which should be smoothed and rounded. All diseased granular tissue must be removed, so that a healthy blood clot will form, which acts as a matrix for the formation of new bone.

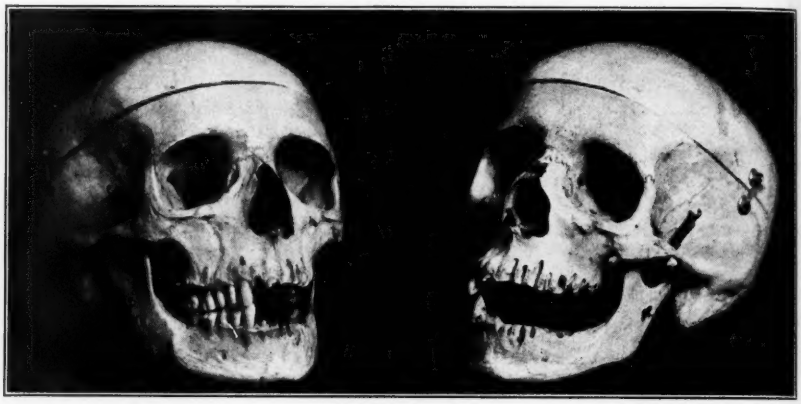

Fig. 1.—A skull on which the preparation of the osseous structure has been made, illustrating the amount of bone which should be removed. The conservation of the interseptal bone and smoothness may be noted, as well as the fact that the buccal plate has not been removed from the mandible, only the sharp margin of the process.

The soft tissues may be retracted prior to or after removal of the teeth, just as is preferred by the operator. If the former method is selected, the labial interstitial gum septums should be incised with a sharp lance, the blade being passed around the necks of the teeth labially and buccally, in order to release the periosteum from the periodontal membrane. The lingual or palatal tissues are not disturbed at this time. The mucoperiosteum is carefully retracted with a suitable periosteal elevator, and, while the field is being kept free from blood by a specially devised aspirating device, a small amount of alveolus, labial or buccal to each tooth, is removed

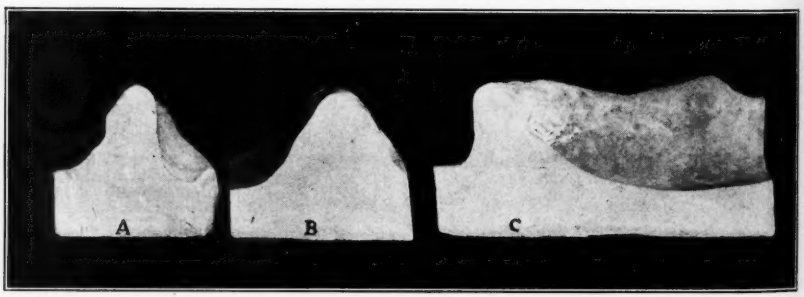


Fig. 2.—Cross section of prepared maxilla: *A*, cuspid region; *B*, second molar region; *C*, *median line*.

by the use of a chisel; and it is surprising how the extraction of the teeth is facilitated by the cutting away of such framework upon which the future arch is to be built and the denture constructed.

If the second method mentioned is

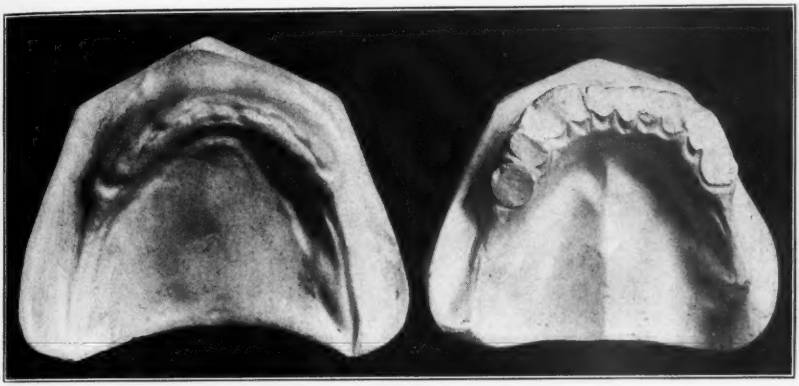

Fig. 3.—Preparation of mandible; ten anterior teeth.

a small amount of bone. The teeth are then carefully lifted out of their sockets. The reason the word "carefully" is used in connection with the manipulation of these tissues is that the bone, as well as the soft tissues, is easily traumatized, followed, the teeth are extracted before the soft tissues are retracted, if they can be released from their sockets without fracture or traumatic injury to the alveolus. When this is done, the interstitial gum tissue should be cut away with

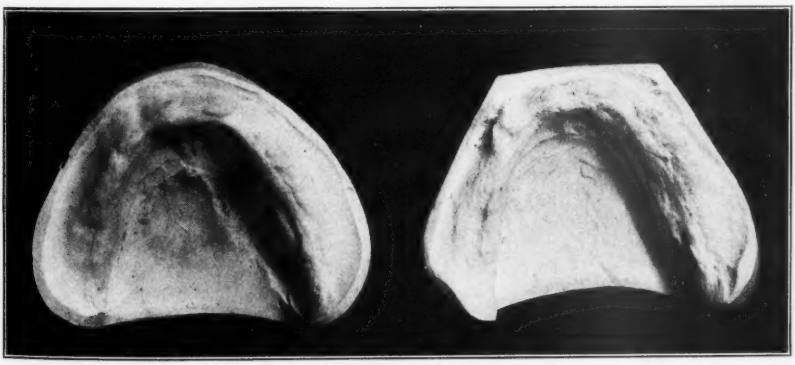

Fig. 4.—The change in position of the muscle attachments in the mental region may be noted.

and the alveolus is very fragile. The teeth should be removed without breaking the septum, as the septum is the scissors of a suitable type. The mucoperiosteum is then retracted, and just enough of the labial or buccal alveolus

and septum is cut away with rongeurs and chisels to produce a rounded labial

in the average case, it will be found that there is just enough mucoperiosteum to

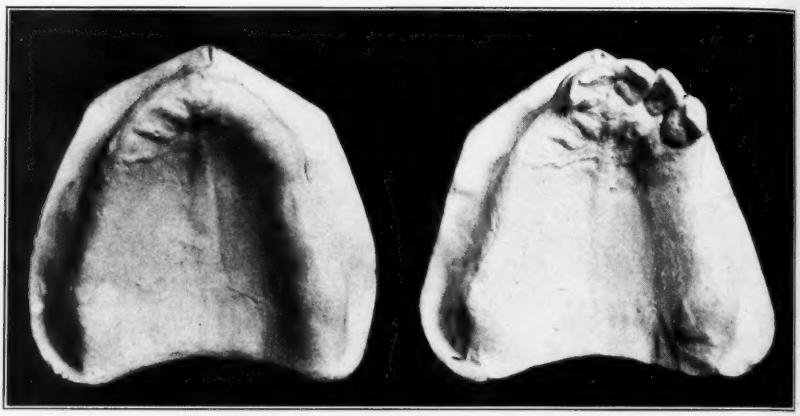

Fig. 5.—Before and after preparation.

and buccal ridge. The palatal or lingual mucoperiosteum is then retracted and sufficient bone removed to produce a symmetrically oval ridge. The mucoperiosteum is carefully preserved until the necessary bone has been removed, and,

protect the bone adequately. However, there are exceptions to this rule, as in some extreme cases there is an excess of

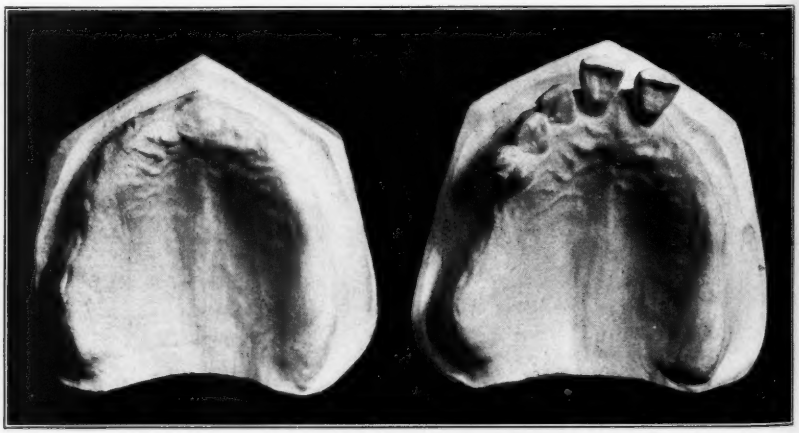

Fig. 6.—Reduction of the tuberosity may be noted.

tissue which must be disposed of. The operator should be the judge.

In many cases, it is necessary to cut

a V-shaped notch in the tissue at the maxillary cuspid region to compensate for

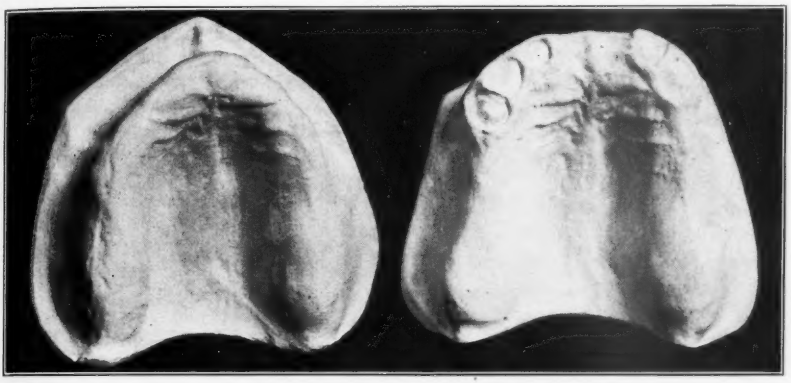

Fig. 7.—Owing to the deep undercuts in the cuspid region, a great amount of reduction was necessary.

the bone that has been removed, but this is rarely necessary in the mandible. Suturing the tissues at this point prevents to a great extent their sagging into the sockets. If this sagging occurs, the prosthetist should smooth the impression or denture, as the suction will tend to produce a smooth arch. A V-shaped notch should be cut in the tissues over the tuberosity, the bone smoothed and the parts brought together with a suture.

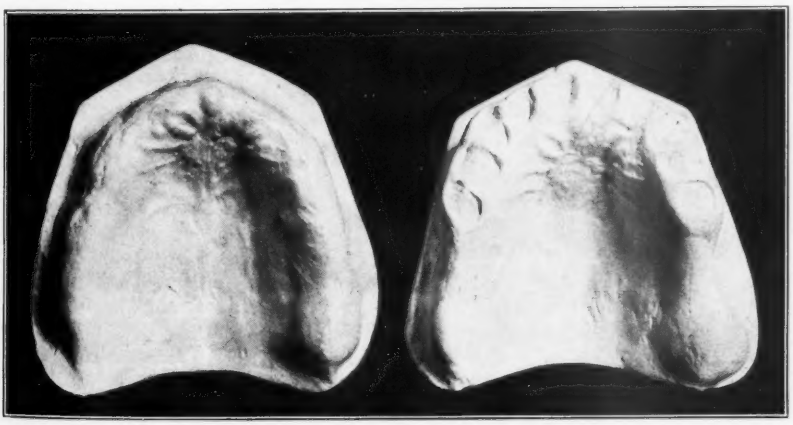

Fig. 8.—The symmetrical outline is evident in the anterior portion, as is the reduction of the tuberosity.

One suture is placed over each septum or between the sockets to hold the flap in position. The sutures must never be

tied tight enough to produce tension as it tends to draw the muscles to the ridge.

In partial cases, that is in cases in which some of the teeth have previously been lost, for example, the first molar and second bicuspid in the mandible, an

Fig. 9.—Lateral view of cases shown in Figures 7 and 8.

incision is made beginning at the distobuccal angle of the first bicuspid, extending downward and backward to the mucous fold at an angle of about 45 degrees to the occlusal plane of the teeth. Another incision is made from the center of the ridge beginning distal to the first bicuspid, extending to and connecting with the incision mentioned at the mucous fold, thus removing a V-shaped piece of mucoperiosteum. This may be done prior to or after the removal of the teeth. The mucoperiosteum is then retracted both buccally and lingually, the operator thus obtaining a clear view of the bone at this point, which should be smoothed, thus producing a nice oval ridge. This is very important when the amount of pressure exerted on the denture in this region is considered. A V-shaped piece of mucoperiosteum is removed anterior to the second molar with the point of the V extending along the ridge, and not in the direction of the mucous fold, as in the one just previously described. The second and third molars are then removed; and the buccal mucoperiosteum is retracted, and the sharp process chiseled away. The lingual side is palpated for the sharp process and nodules, and, if they are found, as they will be in about 50 per cent of cases, the lingual mucoperiosteum is then retracted and the bone is given a smooth, oval surface. This can best be accomplished by the use of chisels and mallet.

Osteomas are frequently found on the lingual surface of the mandible and the hard palate. To remove them from the lingual surface of the mandible, the lingual mucoperiosteum is stripped from the bone, exposing the osteoma, which is then chiseled away. Usually, this can be accomplished by a few sharp blows of a mallet, the formation coming away in its entirety. Very irregular nodules, varying in size, are often found in the hard palate. They should be removed as they interfere greatly with the stabilization of the denture. A semilunar flap may be raised, exposing the osteoma, which is then removed by the use of chisels; or an incision may be made in the median line beginning posterior to the formation and extending anteriorly to it, and two lateral incisions cut at right angles to the extremities of the incision and a unilateral flap raised. Great care should be exercised in the removal of bone from the

hard palate in order to avoid puncture into the nasal cavity, which would result very seriously.

In many cases, muscles are attached so close to the ridge that they interfere greatly with the stabilization of the denture. Muscles of this type should have the attachments released and be allowed to form new attachments; but this should not be done until the denture is finished. The prosthetist should trim the cast where these muscles are attached, allowing the rim of the denture to extend as far down on the ridge as is desired. The patient is then returned to the surgeon immediately, to have the muscle attachments released. When this is done, a small amount of guttapercha (temporary stopping will do) is placed on the rim of the denture and given an oval surface and enough bulk to produce a positive pressure on the mucous fold over the muscles. This method has proved very satisfactory to both patient and operator.

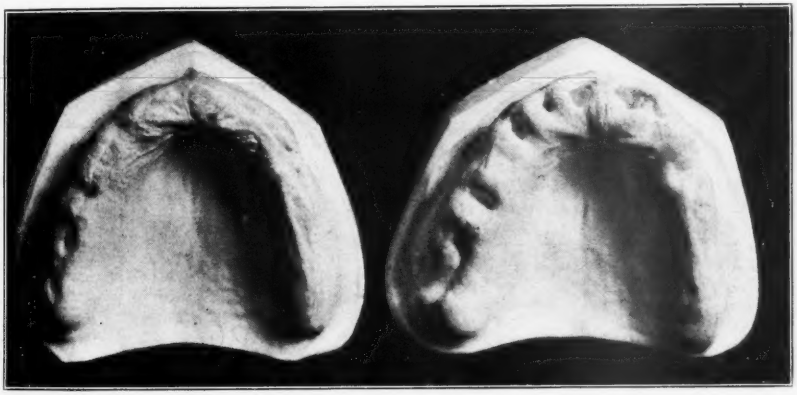

Fig. 10.—Attention is called to the sagging of the tissues on the left in the model before operation. The model, after operation, shows a symmetrical outline accomplished by the manipulation of the mucoperiosteum.

## DISCUSSION

*Ewell Neil, Nashville, Tenn.:* When this subject is broached in any group, the majority of the group think at once in terms of bone surgery, having in mind the physical form of the ridges and arch. This is very well and of great importance, but I would remind you that it is only one phase of the subject. I believe the prosthetists and most of the oral surgeons are of one mind as to the importance of leaving the ridges and arch with a definite form. Those who do not appreciate this phase of the subject simply have not given serious consideration to the basic laws of physics. The oral surgeon should really be a trained prosthetist, for it is then that he will visualize the ideal mouth conditions that he is about to attempt to produce. He will make an intensive study of the mouth from the prosthetist's standpoint before he begins to operate, and the result will be the most favorable ridge relation and physical form possible in the case in hand. I don't believe Dr. Blue made reference to the importance of securing an ideal ridge relation.

As stated, the average surgeon thinks in terms of bone surgery, and we are all fairly well agreed as to the proper procedure here.

I should like now to call your attention to plastic surgery, with a consideration of its place in this field of our work. How many surgeons know the anatomy of the oral cavity as they should? Can they close their eyes and visualize this anatomy in its minutest detail as clearly as they visualize the various letters of the alphabet? which means that they will see almost to a millimeter every actively functioning plastic tissue in the oral

cavity. I am thinking of the origin and insertion of such tissues as the pterygomandibular raphe, the superior constrictor muscle, the lingual and labial frenums and the mylohyoid muscles, all of which are considered as border tissue attachments. Does the surgeon recognize these when they are normal, and so is able to recognize the abnormal? Does he recognize adhesions that come as a result of careless and indifferent extractions, and does he differentiate between these and normal border tissue attachments? I would not burden you with a detailed discussion of this phase of mouth surgery, but I would like you to consider it seriously, for it is a fact that many mouths that have been prepared by the surgeon show beautiful results as far as the bone surgery is concerned, and yet they are far from ready for dentures.

I would advocate in many cases two separate operations; the first having as its object the elimination of infection and the giving of proper ridge relations and physical form; a subsequent operation giving proper border tissue attachments.

Dr. Blue refers to this phase of the work, and I am sure he has a clear conception of his duty regarding this phase of the work, but I am stressing its importance for the reason that too many men think exclusively in terms of bone surgery.

Think of the pterygomandibular raphe and its normal attachment to the hamular process just distal to the maxillary tuberosity. When this attachment is normal, it interferes in no way with the upper denture, but it is frequently found to send tendons over to be inserted into the distal wall of the tuberosity. The surgeon should recognize these abnormal conditions and correct them. When you consider the normal insertion of the superior constrictor of the pharynx, you will find that it never interferes with the proper placing of the margin of the lower full denture. However, it is found in about 10 per cent of all mouths to have an abnormal insertion, and, in these abnormal insertions, tendons of this muscle will be found inserted into the periosteum over the pretonsillar area, which is an important factor in determining the position of the margin of the lingual flange of the full lower denture.

*Edward H. Bruening, Omaha, Nebr.:* In Dr. Blue's pictures, the mouth preparations, all present smooth, well-rounded ridges. This, I take it, is his ideal for every case, and I wonder if he is paying due attention to what we prosthetists consider a fundamental principle for the most successful use of dentures; namely, maximum surface area. The greater the surface area, the less trouble we usually have in constructing dentures that fulfil the functions expected of them.

He may be removing bone tissue that in some cases should be left in order to secure these smooth surfaces that may prove ideal for "skidding" and interfere seriously with stability while the patient is learning where to place the mandible in relation to the maxilla. My plea is for conservation of bony tissue that does not show the effects of pathologic change and does not seriously interfere with esthetics, even if it leaves a somewhat irregular ridge. We must not forget that about bone regeneration and should take advantage of this fact whenever possible to form a strong, prominent ridge that will not rebel against the forces applied in the mastication of food with artificial dentures.

I hope this section may have an opportunity to hear Dr. Blue again on this subject, and that he will at that time go into further details regarding this important subject.

*W. F. Chappelle, Buffalo, N. Y.:* In supplementing what has been said with respect to using the lip line and the lip contour as a guide, the subject of removal of tissue in other parts of the mouth to me is largely a question of removing what you can't actually and carefully fit your impression to. If you have ridges so deep or tissue so irregular that you can't clear it, then it might better be out of the way.

To me, the biggest item in determining the value of surgical preparation of mouths is getting the patient to use the denture properly afterwards, so as not to cause continued shrinkage of areas where dense buccal or labial plate has been removed. In making dentures before extraction, the natural teeth are matched; an impression is taken; the teeth are cut off one at a time; the tooth that has been chosen for color and form is reground and stained to conform to the natural tooth as nearly as possible, and waxed in place until the arch is completed, and then the case is waxed up. The model is trimmed to a degree determined by consultation with the oral surgeon, and trimmed duplicate models are used if necessary. The dentures are placed immediately after extraction.

Rather than fit the labial portion and buccal portion of the denture closely to the tissues, the margins are extended slightly to develop a peripheral seal in the soft muscle tissue, and no relief whatever is placed in the palate unless there was a narrow strip of hard palate—no other relief besides that. That gave a good bearing on the roof and peripheral seal in the soft muscle tissue, and no pressure against the labial portion or buccal portion of the ridges.

It was found that if the patient was kept

from doing any chewing whatever on the dentures for a period of ten days, simply wearing them for looks; or after five days, if he used them at all, using them only with soft food and then chewing with simply a chop bite on both sides at once, but never doing anything to wiggle the denture and cause disturbance of the clots, the combination of the peripheral seal, the bearing on palatal surface and the lack of use favors a considerable regeneration of bone, owing to constant slight suction. It is necessary to warn against habits of clinching teeth or dislodging dentures by tongue and lip pressure.

*T. P. Sloan, Lebanon Junction, Ky.:* Some operators may say dentures should be made to fit in the first place, but I have found that it matters not how efficient the dentures may be at the time of insertion, there are certain physiologic changes that take place in the hard and soft tissues, an anatomic change over which we have no control, necessitating surgical preparation of the mouth before the maximum efficiency can be obtained. I refer particularly to the maxilla in which we usually find a good deal of excessive soft tissue in the region of the tuberosity. Also, in cases of close proximity of the tuberosity of the maxilla as related to the opposing teeth below, I have found it necessary to remove surgically the excessive soft tissue and the buccal plate of the hard tissue of the tuberosity, before I could get the desired results.

As regards cutting the labial frenum and the buccal muscles, I do this in about two-thirds of cases that I rebase. I never hesitate to clip the muscles and let the periphery of my denture extend as high as the tissue will permit, thereby facilitating retention efficiency through the periphery seal.

*F. M. Hight, Houston, Texas:* One phase of this work that should interest the dentist who is to make the dentures is a better relation of the ridges, through proper mouth preparation. Another point or guide as to the amount of process to be removed in the anterior region is the upper lip. We should bear in mind that the labial flange of a denture should be at least 2 mm. thick so that an amount sufficient to enable this flange to be placed without changing the original position of the lip should be removed. In the lower jaw, it is advisable to remove the process in the anterior region until the lower lip hides or covers the ridge entirely, as a precaution against the display of vulcanite.

*Dr. Blue (closing):* Dr. Neil brought out one point that I think should be stressed: the importance of studying the anatomy of the mouth with reference to the work of both the surgeon and the prosthetist so that the highest degree of service may be rendered. We are anxious to know just what you want, and if possible how to get the desired results. We want to cooperate with you in every way possible.

Dr. Bruening speaks of the ideal. In every case, we must have a picture of the finished arch in mind. I should like to emphasize the fact that it is much easier to cut bone away than it is to replace it, and many of these prominent areas referred to on the slides in the region of the tuberosity instead of being cut away entirely have merely been reduced and given a more symmetrical outline.

It is also important, as Dr. Bruening points out, to follow these cases up from year to year; figure on the results you are getting; study the methods of the men who are making the dentures; see whether they are carrying out their part of the game; and determine whether it is the fault of the surgery or the denture when poor results are obtained. In some of these cases, I will admit that we have some excessive absorption, and it is a question which of us is at fault.

Dr. Hight gave us a little sketch showing a sharp ridge. We are trying to avoid a sharp margin of bone under the tissues, as the pressure of the plate will produce an irritation at that point.

Dr. Chappelle brought out the point that we should work more closely together. This cannot be stressed too greatly. Dr. Sloan, mentions the reducing of the tuberosity. If you will remember, I pointed out several cases on the slides where this had been done.

It is very important that roentgenograms be made in these cases so that one can steer clear of the antrum, as you often have quite a dipping, and removal of even the slightest bit of bone from the floor will lead into the antrum.

# PROPHYLACTIC TREATMENT OF PITS AND FISSURES WITH TECHNIC FOR FILLING THEM WHEN CARIOUS

By JAMES MARK PRIME, D.D.S., Omaha, Nebraska

(Read before the American Dental Association, Dallas, Texas, Nov. 10-14, 1924)

CARIES of the teeth divides itself into three general groups: (1) that occurring in the pits and fissures confined largely to the occlusal surfaces of the bicuspids and molars; (2) that developing on the approximal surfaces of all the teeth, and (3) the gingival cavities, likewise, on all the teeth. The first group occurs because of physical imperfections in the tooth structure, while the other groups are environmental. We purpose to confine this essay to the first group.

Dr. Thaddeus P. Hyatt,[1] in the service of the Metropolitan Life Insurance Company of New York, made an extensive tabulation of caries on the various surfaces of the teeth. His observations included 39,000 cases, and his findings are a valuable contribution to our knowledge of the subject. His figures show that more cavities find their origin in the pits and fissures than in all the other surfaces combined.

In a set of thirty-two teeth, there are 148 surfaces exposed to the action of caries, not counting the incisal edges of the incisors and cuspids. When we consider that of these 148 surfaces, there are only twenty occlusal surfaces of the bicuspids and molars, and in these twenty surfaces more cavities form than in all the remaining 128, the fact grows into a most interesting and vital subject. Add to this statement the fact that caries in these pits and fissures is subtle in that the decay may spread laterally and rapidly along the dento-enamel junction, unobserved until the cusps are undermined and the horns of the pulp are involved. These truths compel us to recognize this as one of the most important phases of operative dentistry.

How many cases come under our observation in which all the teeth back of the cuspids have been lost? Does this not signify that these teeth possess a vulnerability not found in the front teeth?

My first effort, though perhaps not new, shall be to offer you a plan to prevent the formation of these carious cavities. My second shall be to outline a technic by which they may, in their early stages, be filled in a manner feasible and insuring permanency.

The technic for filling must necessarily be limited to patients having reached the age at which the rubber dam may be applied. The preventive measures may be instituted at an early age and are applicable to deciduous teeth as well.

I have no intention of opening the discussion started by Dr. Hyatt's paper on "Prophylactic Odontotomy." Whether or not we agree with him, we should admit, at least, that he has brought to our

1. Hyatt, T. P.: Prophylactic Odontotomy, Dent. Cosmos, March, 1923.

attention the tremendous vulnerability of the occlusal surfaces.

As the matter stands, all seem to agree that a fissure is a fault, but there is a wide range of opinion as to whether or not they should all be filled.

In order to maintain a conservative position, to avoid going to dangerous extremes, we wish to quote from Dr. G. V. Black[2] on "Faults in the Structure of the Enamel." He says: "These pits occur in the occlusal surfaces of the teeth of all animals that are omnivorous in their diet, and should not be regarded as abnormal in man. The fact, however, that decay in them occurs so frequently gives abundant evidence that they furnish the opportunity for its beginning." On page 207 of the same volume he says, under the heading "Cavities of the First Class":

> When examining for pit and fissure cavities in children of families highly susceptible to caries, the least showing of the beginning of caries should not be allowed to pass without immediate treatment. These decays are too often allowed to burrow deeply before treatment is instituted. The dentist should never lose sight of the fact that in young persons the pulps of the teeth are much larger and their horns are much longer than in the teeth of mature persons. For this reason the pulp becomes endangered by a decay of much less depth. Sometimes they will even reach the pulp of the tooth before making any noticeable showing upon the surface. The carious material is white, the surface of the enamel is complete except the pit or fissure. It may show through the enamel as a grayish area, or the decay may not be detected except by the fine-pointed explorer. All such decays occurring in susceptible children demand immediate attention. This condition must be differentiated sharply from the conditions so often found in older persons, in which these pits and fissures are much darkened or actually black. This dark color occurs where some slight softening of the enamel has taken place earlier, and is often mistaken for active decay. It is rather an evidence of immunity from the beginning of new areas of decay. But there may be an active area of decay beneath this dark coloring, and this must be determined by the explorer. While the dark color is evidence of conditions unfavorable to decay, decay, having begun, may be continuing. This demands examination, and the operator will be controlled by the conditions found. Very many pits show evidence of some slight softening in early youth, which is stopped by the coming of immunity or some change of local conditions. Then these become dark in color and so remain without further change. These should not be interfered with, as they are just as safe without any filling whatever.

Dr. Bodecker[3] has shown many specimens of fissures with no caries. This is well supported by our own observation. It is only necessary to examine teeth in mouths of patients of from 30 to 50 years to discover many fissures—usually dark in color—yet no evidence of decay. This fact may be supported by examination of your extracted teeth (if you keep them, and you should), in which you will find many teeth presenting well defined fissures and pits with no caries. We must all agree that Dr. Hyatt's contribution is correct in that a very high percentage of these fissures do show decay. We should further admit that it would be better to fill some of these pits and fissures, around which the tooth possibly would not decay, especially provided they are well filled, than to allow many teeth to go on to ultimate loss.

How, then, shall we determine which should and which should not be filled? Can we judge by the height of the cusps? Can we safely depend on the color of the teeth? Can we hope to prevent caries by frequent and thorough brushing? Can we rely on the manner in which our explorer hangs in the fissure or on the color of the enamel within it? While these considerations are of more or less value in making our diagnosis, they are often not sufficiently reliable to keep us on the safe side. This brings me to a method that I, and others, have employed for years, whereby we are, to a degree, able to make this diagnosis and apply our treatment, and I offer it to you for your consideration.

2. Black, G. V.: Operative Dentistry, Pathology of Hard Tissues of the Teeth, Vol. 1, pp. 268, 206-208, 247-257.

3. Bodecker, C. F.: Dent. Cosmos. October. 1924.

Let us begin with deciduous teeth before there is evidence of caries. It is necessary in this, as in a large portion of other operative procedures, to use the Beebe binocular loupes. With the air syringe, the saliva is blown from the occlusal surface of the molar to be examined. If anything approaching a pit or fissure is present, a sharp No. 1 round bur is carefully drawn along the line of the fissure and repeated until a groove is cut, perhaps the depth equal to the diameter of the bur, or, at least, until a point is reached where the enamel lobes have coalesced. Another bur, size No. 2,

Fig. 1.—The dotted line shows amount of cutting necessary to remove this fissure, leaving a smooth nonretentive groove.

is drawn along the groove cut by the first, but not so deep. Then with a still larger bur or a very small stone, the groove is widened until we have transformed a sharp fissure into a shallow, smooth-bottomed groove. This groove is polished with a Burlew disk or by any method you may choose just so a smooth round-bottomed groove is left in a highly polished condition (Fig. 1). Each one of the molars is examined and if necessary treated in this manner. Not more than two teeth should be immunized at a sitting for fear of tiring the little patient. The little folks do not object to the procedure for no pain is caused. In fact, they soon learn to look on it with no fear whatsoever, and we gain the much desired child confidence so important should future work causing pain become necessary. If these faults continue deeply into the tooth structure and a smooth rounded groove cannot be created, a filling becomes necessary.

We do not favor the so-called "prophylactic cement fillings" in deciduous teeth when the occlusal surfaces must be distorted and the erupting teeth may be prevented from taking their normal position. The incline surfaces of the cusps are a guide to direct the tooth to its position, and when a fossa is partially filled with this cement, it is apparent that proper occlusal relationship may be prevented.

Fig. 2.—These molars had fissures alike as nearly as could be determined. One is untouched, while the other has the fissures immunized and the entire occlusal surface polished.

The method described for immunizing the deciduous occlusal surfaces is followed in caring for the permanent teeth, except that the dam is usually applied.

I need not say that at frequent intervals a close observation should be made of the erupting permanent molars. The tendency to caries in these teeth is well known. An effort to immunize their occlusal surfaces should not be delayed. It will be found that immunization of these teeth is only possible in a small percentage of cases. Decalcification has in many cases already begun, and fillings must be made.

When the child reaches the age of 10 years, the rubber dam may be adjusted,

and this work may be more effectively accomplished.

It is important that the first cutting be made with a small No. 1 round bur. This is exploratory, to determine whether we shall be able to immunize the tooth or be compelled to fill it. It is highly important, in the event we decide to fill, to recognize that a wide cavity is greatly to our disadvantage, as I shall undertake to prove in discussing the technic for filling these small cavities. If we are to keep them narrow, it is apparent that we must not begin our cutting with a large stone or bur, lest our margins be extended entirely beyond what is necessary.

Fig. 3.—Two third molars showing the results of treatment of the fissures in one of them. It is not often possible to immunize the fissures in third molars without finding one or more places requiring filling. More often, all the fissures call for filling.

It is a well recognized fact that many pits and fissures extending deeply into the enamel continue immune, while the cusps are being worn down by abrasion. As the cusps are worn shorter, the tendency for retention of débris becomes less. The excursions of food passing over the fissures prevent the formation of plaques. Decay under these conditions seldom occurs.

Many times, we see a discolored area on the proximal surface of a tooth exposed to view by the removal of the approximating tooth. Decalcification has progressed almost to the point of softness. The approximating tooth may have been removed years before, and, on its removal, the environment was so altered that decay was at once arrested. This surface became relatively immune because the excursions of food over it, aided possibly by the cheeks, lips and tongue, and in some cases perhaps by the toothbrush, all assisted in keeping the surface clean, and as a result caries was, to some degree, if not entirely, arrested.

This is comparable to the condition we secure in trimming out these fissures. The excursions of food keep them continuously clean and, in almost all cases, immune (Figs. 1-6). The question naturally arises: What if the tooth decays after this prophylactic effort has been

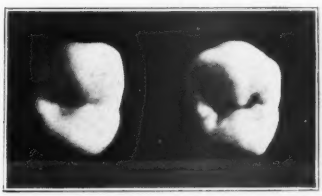

Fig. 4.—These bicuspids were mates and were extracted at the same time. They seemed to be identical in all respects. Both would probably have decayed. One is untouched, the other immunized.

made? I reply with some degree of certainty; because, in the years I have been following this method, I have, to be sure, had *some* failures. If, by the prophylactic measure, the fissure was not completely removed, and as a result caries returns, the area of decay is brought plainly to view and the process does not continue unobserved until the enamel falls away. Instead, the little carious lines or pits in the bottom of the groove are discovered and filled with ease and certainty by the method to be described later.

Many fissures are shallow throughout their length, and a pit will be found at each end. These pits are deep, and each pit should be separately filled and the

connecting shallow fissure immunized as described.

Our journals have had much to say of late on the treatment of these pits and fissures. Is it not strange that all who have discussed this important subject seem to stand on the assumption that a cavity filled is permanently immunized? In other words, they seemed to have failed to recognize the fact that, if these pits and fissures are poorly filled with an unreliable material, the trouble may be only postponed, to reappear in a more serious form.

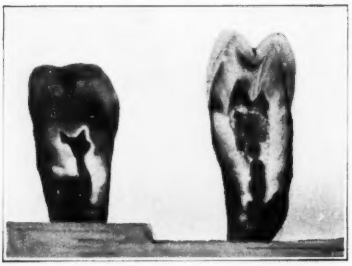

Fig. 5.—Cross-section showing two shallow fissures. These fissures showed no evidence of caries and perhaps decay never would have developed.

Let us presume that pits and fissures are cut out with wide cavities, (Figs. 7 and 8) as is ordinarily done, and filled with amalgam. While we recognize the fact that a small percentage of amalgam fillings in Class one cavities last for many years, the majority fail in a short time. It may be said that this is a result of faulty technic in not using the rubber dam and not removing all the decay. Perhaps so; but the fact remains that, in the hands of the ordinary operator, these fillings soon fail; and if they fail, as a great many do at one or more of the margins, the results are very damaging. The caries in this case is simply removed from the original fissure to the margin of the amalgam filling. This is nearest the pulp horn, which becomes early involved (Fig. 8); and another bad feature lies in the fact that a very small amount of decay at this point undermines the cusp. If an extended observation (such as Dr. Hyatt made for fissures) of 39,000 cases, the pits and fissures of which had been filled with amalgam, should be thoroughly made by removing the fillings, I venture the opinion that the results would be surprising. If the same number that had been filled with silicious cement could be examined, in the same manner, the results would in all probability be still worse.

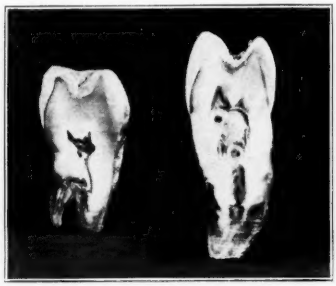

Fig. 6.—Teeth shown in Figure 5, immunized.

Are we to accept the cast gold inlay advocated by some, and so generally used, as ideally meeting the requirements in these numerous fissure cavities? Are we willing to accept a technic requiring the extensive wide, deep cutting, in order to manipulate our wax, for the cast gold inlay? (Fig. 7.) Can the effect on the dental pulp of this unnecessary cutting, as it would be required on an upper molar having fissures in the occlusal surface and following the distolingual groove onto the lingual surface, be imagined? Shall we adopt such a radical technic in an effort to manage these countless fissures? If we do, let us pause to realize the possible shock to the pulp, the very exacting task of restoring the anatomic forms of all this structure removed—the long cement line, which

should always be considered a weakness, particularly on the occlusal surfaces, being subjected to the churning, washing and abrading forces of mastication; to say nothing of the injuries possible to the periodontium from distorted and malformed restorations. Conservation of tooth structure compels us, if we use good judgment, to make these cavities as narrow and shallow as conditions will permit. Wax cannot be manipulated in such small, narrow cavities, and to advocate the inlay simply means added pain to the patient, and the unnecessary loss of vital tooth structure, greatly increasing the time of the operation and exposing the ends of the vital fibrils to irritation and infection by the forcing of the wax against the dentin walls.

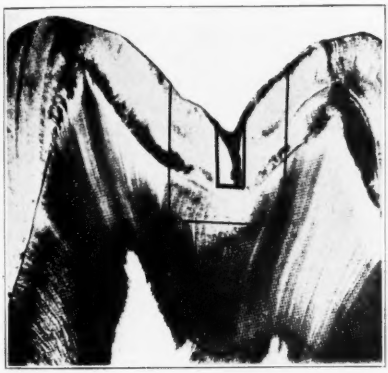

Fig. 7.—The lines nearest the fissure represent the correct extension for gold foil. The larger outline represents the usual extension for the cast gold inlay. The smaller cavity is the better from every angle of consideration.

Let me repeat that Dr. Hyatt's contention for early attention to the erupting permanent molars is highly important. A very limited number only can be successfully treated by the prophylactic measures previously described. An effort to immunize these erupting molars usually results in the disclosure of a carious condition requiring a plastic filling of either cement or preferably, *amalgam;* and the child and parents must be instructed that the fillings are only temporary and so will require replacement when the patient reaches the age when the teeth have taken their position and the dam may be applied.

### TECHNIC FOR PREPARATION OF CAVITIES AND FILLING PITS AND FISSURES

As regards the technic for the preparation of the cavities and filling of these pits and fissures I shall return to first principles, sound and proven, having the well-being of the patient as my first consideration, coupled with a desire to perform operations that will endure, not for a decade but for a generation.

Fig. 8.—The dotted line indicates the line of fracture. The bicuspids are frequently fractured in this line when no cavity or filling is present. It is plain to see how this tendency to fracture is increased if the cavity is made unnecessarily wide and deep.

We will presume that we have a patient 10 years or older (older is better). The molar or bicuspid to be examined has the saliva blown from its occlusal surface with the air syringe. By the aid of the Beebe binocular loupes and a sharp explorer, the surface is carefully examined. Pits and fissures are found. The dam is applied. With a No. 1 round bur, a light cutting is continued along the fissure. This is repeated until a point is reached where the enamel plates have united. If this is found, we can

immunize it as previously described. If the fissure continues, as it more often does, to the dentin, a filling becomes necessary. All the pits and fissures are followed out in like manner. It will many times be found that the fissure may be immunized in part, the fault extending deeper at other points. I immunize these places where it is possible, and fill these spots or points where it is not.

We will say the case in hand is of that class representing the majority wherein we are compelled to fill. Our exploratory cutting, therefore, has contributed to

Fig. 9.—Pits and fissures of upper first and second molars filled with cohesive gold foil. The first molar had an unusual number of pits. The second molar represents about the usual condition. The checks in the enamel are the result of drying.

the ideal cavity preparation for these cases. The No. 1 round bur having cut a slot ranging from 0.6 to 1 mm. in width, a square end plain fissure bur, a trifle larger than the slot cut by the round bur, is now put in a contra-angle hand piece (in which there are no loose bearings) and firmly held. The cavity is enlarged through its entire length. The next bur is also a square end fissure, usually about 1 mm. in diameter. The cavity is carried pulpally just as far as the fissure extends and no more. It will be found that it usually continues through the enamel to the dentin. If there remains some sound enamel covering some portion of the pulpal wall, it may be left with no ill consequences whatsoever. By the inclination of the enamel rods, but little beveling of the cavosurface angle is necessary. No undercutting is necessary. In shallow cavities, a pit may be cut for convenience, for starting our filling.

There is great danger in overextending these cavities by the use of the chisel, so we have practically discarded its use for this purpose. The inclination of the enamel rods is all toward the cavity, and if a large piece of enamel is chipped away, the cleavage is very likely to follow the line of the long axis of the rods and thereby greatly enlarge the internal part of the cavity. This explains why an occlusal cavity seems to "get away from us," as it were, suddenly becoming so much larger than we intended to make it. The burs, as described, meet the requirements perfectly.

To quote Dr. Black:[4]

> Extension for prevention does not mean deep cavities in any case. The whole intention is to prevent the beginning of decay in the surface of the enamel. It does not have any reference to caries of the dentin whatever. The *shallowest cavity* that will give sufficient stability to a filling answers the requirement. Under all circumstances in filling teeth, the object should be to make cavities only deep enough to give stability to the filling, except as deeper cavities are required by removal of the last trace of decayed material.

### FILLING WITH COHESIVE GOLD FOIL

These cavities are filled with cohesive gold foil, pellets not larger than one sixty-fourth of a sheet being used. The filling is started at one end of the narrow cavity and continued along the pulpal wall to the opposite end until the cavity is slightly overfilled. The filling is well condensed in all its internal parts, but special attention must be given the last pellets so that the gold will be most thoroughly condensed and the filling thereby given a very hard surface, to insure that there will be no pits and

4. Black, G. V.: Operative Dentistry, Technical Procedures in Filling Teeth, Vol. 2, pp. 145, 120, 121.

to make a surface that will take a high polish and hold it. Very small plugger points are required, from 0.3 to 0.5 mm. For greater convenience in the back part of the mouth, we suggest the balanced plugger, illustrated in Figure 10.

The finishing is begun with a round bur, one that is not sharp best serving the purpose. The bur must be sufficiently large to ride on the enamel at each side and not cut below the margins. In this manner, the gold is cut flush with the enamel. The engine is then reversed and the bur (one that is not sharp is employed), running backward, gives a burnishing effect by the blades, and leaves a good smooth surface. The final polishing is done with the Burlew sulci disk, or a soft rubber wheel with prepared chalk. A small mounted fine grit stone may be used to cut away the surplus gold, turning it toward the enamel margins. These stones cut enamel readily so care must be used. We find a bur, as described, serves best for these small narrow fillings (Fig. 9).

Our records show that the average time for these operations (and we perform hundreds of them), including cavity preparation, filling and finishing, is about fifteen minutes. If caries has started and begun to spread along the dento-enamel junction, every trace of the decay must be removed, and the undermined enamel as well, which enlarges our cavity and necessarily increases the time required for the operation. If the latter condition exists, and our cavity is therefore made wider and deeper, our pulpal wall may, after the decalcified dentin is removed, be left somewhat rounded. It is not necessary that it be squared, for by so doing we hurt our patient, cutting directly toward the pulpal horn; and cutting in the line of fracture endangers the cusps. In this case, we start our fillings with larger pellets, perhaps as large as one-sixteenth of a sheet, and these first large pellets are not annealed, but are soft and non-cohesive. These first soft pellets are condensed with a larger point, the face of which would measure 1 to 1.5 mm. With these soft pellets, the cavity is perhaps one-half filled, when this soft gold is covered with pellets of the same size but are annealed, thereby being made cohesive. These cohesive pellets require

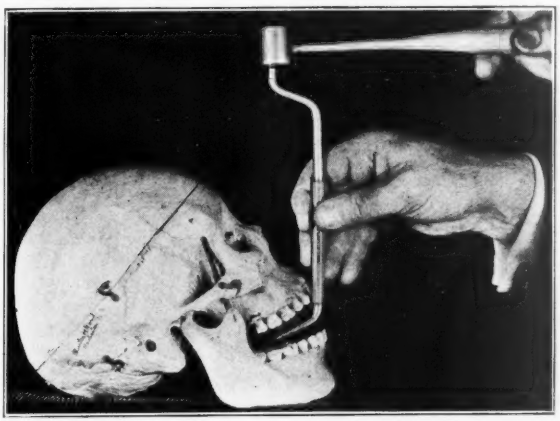

Fig. 10.—Balanced gold foil pluggers. With this instrument, lines of force may be secured in many seemingly inaccessible places.

a smaller plugger point. The operation is finished with smaller cohesive pellets and plugger points of 0.3 to 0.5 mm.

These operations require two instruments, a holding or assisting instrument, held in the left hand, and the automatic plugger or, preferably, the long handle plugger malleted by the assistant, held in the right hand. With the instrument in the left hand, the gold is held, while, with the plugger in the right, it is condensed.

The same technic applies to the buccal pits of the molars and the lingual pits of the upper incisors.

### THE RATIONALE OF GOLD FOIL IN THESE CAVITIES

Because of the narrow cavities, the gold foil can be condensed with easy natural lines of force. The malleability of the material gives a flow of the gold against the walls, securely wedging, with lines of force nearly or quite parallel to the walls.

Less cutting of tooth structure is required than for any other material, especially the cast gold inlay (Figs. 7 and 8).

The sterile gold fresh from the flame is wedged securely into a dry, clean cavity. It is as nearly surgically clean as is possible in an operation in a tooth.

Gold serves humanity better in dentistry than for any other purpose for which man uses it. There is no other place in dentistry where gold meets as many of the requirements as it does in filling this class of cavities. As the enamel rods at the cavosurface are perfectly protected by the gold's being in actual contact and wedged against them, longer enduring and better adapted margins can be secured than by any other filling material.

But little if any more time is required than for the plastics and very much less time than the cast gold inlay.

Danger of fracture is reduced (Fig. 8), and the dental pulp is given a high degree of protection. An extraordinary degree of skill is not required. Any operator can do the work well if he will provide himself with the necessary instruments, and do a little studying, and in no other line of operative work will a like sum spent for equipment and the small amount of application bring him an equal reward.

Without excessive cutting, gold is the only material with which the long distolingual groove in the upper molars can be filled, and a more enduring operation is possible than with any other material or any other technic.

### CONCLUSION

I am conscious of the possible differences of opinions likely to arise by so called "mutilation" of the teeth by the method set forth for the prophylactic treatment of these surfaces. After years of practicing this method, I am convinced that no injury is done these surfaces, but, on the other hand, hundreds of fissures and pits have been immunized that would have otherwise decayed.

A deep cut should never be made, and left in a roughened condition, and, to be sure, the cutting must never continue to the dentin and the dentin thereby be exposed and left thus. These deep cuts require filling. The angle is simply smoothed out and transformed into a shallow rounded smooth bottomed groove, and left highly polished (Fig. 1). When this cannot be done, a filling must be made.

Conditions are made more favorable for filling, in the event the prophylactic measure fails.

Let me repeat: This is not a method for treating carious cavities. They must be filled. It is an effort to immunize a fault which will, by reason of its retentive form, give protection to organisms and cause decay. In other words, it is a slight change in surface form with no impairment of function.

This plan, we think, has a decided advantage over silver nitrate, particularly in the permanent teeth. The discoloration from its use is very objection-

able, besides we are never sure decay is not progressing beneath it.

We understand the danger that lies in the possibility of some, by reason of a misconception of the plan and principles, doing injury by overcutting, and undertaking to immunize fissures that should be filled; also that sulci and grooves will be cut that require no treatment at all; but, notwithstanding all this, the good to be done will far outweigh the possible little harm.

For good and sufficient reasons, the cavity should be kept shallow and narrow when filling becomes necessary. Immunity is assured with the minimum of extension. Furthermore, it will be remembered that these fillings are exposed to thermal shock of hot and cold foods and drinks more than fillings in any other surfaces. Keeping them small and shallow contributes to prevent this shock.

During the past decade, our profession has been shaken to its foundation by the theory of focal infection resulting from pulpless teeth. Exodontists and prosthodontists have waxed fat, while millions of teeth have been lost. The medical profession has joined in advising their removal. The poor patients, many times confined in hospitals, suffer long, spending large sums of money, and added to this they must tolerate disfiguring and uncomfortable appliances during the remainder of their lives. All this finds its origin in beginning small cavities in the tooth crown. This essay is aimed at the prevention and treatment of the most prolific source.

Is it not time for members of the profession to rise to their opportunity and take their eyes off the apical end of the roots and direct their attention to the crowns of the teeth where the trouble begins?

## DISCUSSION

*Robert E. Blackwell,* Chicago, Ill.:* We are considering a prophylactic measure, and I should like to emphasize in this connection the meaning of the word prophylaxis, because it is being misused frequently in dentistry; often as a synonym for hygiene. The word hygiene refers to those measures that should be taken to maintain health, without any special indication of ill health. The word prophylaxis refers to measures that are taken because of a threatened disease or condition. In other words, there should always be a sign or danger to justify a prophylactic procedure. In practicing hygiene, we should carry out certain measures that are generally recognized as promotive of good health. We should brush our teeth ever so often; we should take a certain amount of exercise; we should bathe frequently, and we should do those other things which should be done by everyone in the promotion of good health. But when we engage in a prophylactic procedure, we engage in a procedure that is directed toward a menace which we see in the particular case. Therefore, prophylaxis should not be applied universally, as hygiene should be. The point is this: We should have a picture of the susceptibility of a mouth before we undertake the procedures recommended in this paper. As was mentioned in the paper, many old persons have deep fissures in the enamel that never have decayed and never will decay, because they are immune; just because a patient has a fissure we are not always justified in grinding that fissure out. It depends on the picture that we are able to form of the immunity or susceptibility of that person. It depends a good deal on the conditions surrounding a man's practice as to whether or not, and to what extent, he should do these things. If one has a practice of which he has very complete control, if he has trained his patients so that the large majority of them come back to him for reexamination as many times and as frequently as he would like to have them, then he is justified in delaying a procedure of this kind unless there is a definite indication for it. He may delay it until the next visit, and the next and the next, and he may delay it all through life unless he sees the actual decay. In the practice of another, who hasn't that same control, and whose patients may live far off, it may be necessary to care for them without knowing whether he will see them again or not, and so he may be justified in going further, in being a little bit more radical, in the application of preventive measures. The rules of extension for prevention do not apply to occlusal surfaces. They apply only to what we speak of as smooth surface cavities, those in proximal surfaces and in the gingival thirds of the buccal and labial surfaces. Immunization of the occlusal surfaces of the teeth is largely a mechanical problem. If the occlusal surface of a tooth is properly

*Discussion read by Dr. A. D. Black in Dr. Blackwell's absence.

formed with normal grooves of smooth contour and without defective pits or fissures, and is used with reasonable normality in mastication, it is immune from decay by virtue of the scrubbing action of food in mastication. Dr. Prime has presented certain plans by which we may modify the regular and routine plan of operating and accomplish the necessary ends by cutting away less of the the tooth and by using smaller fillings. If the grooves of the occlusal surface are not smoothly rounded, he proposes to take round burs and stones and smoothly round shallow pits and fissures and thus immunize those surfaces against decay; whereas, if he left shallow fissures, the teeth would be much more likely to decay. He would not apply this treatment universally, but would apply it on the basis of his judgment or the need, according to the susceptibility of the individual. If a groove is cut out too "sharply deep," if I may use that expression, so that it isn't well cleaned in the mastication of food, a filling would have been the better procedure. Dr. Prime suggests an intermediate measure, by which one may grind the more shallow portion of the fissures and make fillings only at those points where the fissure or the decay has reached the dentin. I am a little afraid that a large percentage of dentists will fail to understand the real problem involved; the problem is one of maintaining an occlusal surface, the natural grooves of which are naturally, or are made artificially, sufficiently smooth so that they will be cleaned in mastication; keeping in mind the condition of susceptibility or immunity.

This paper of Dr. Prime's is especially timely because of the very extensive cutting of these surfaces that is so common today in the use of the gold inlay. In my judgment, the case is very rare in which a gold inlay is justified in the occlusal surface of any tooth. I appreciate the fact that in some teeth in which there has been very extensive lateral decay of the dentin, undermining the enamel, we are forced to prepare a very large cavity, and a gold inlay may be indicated. The number of such cases will depend on the frequency and the thoroughness with which examinations are made. I am quite firm in the belief that in the large majority of those cases that must be cut large, an operator who understands and uses a high grade amalgam will give better service than with a gold inlay.

*Dr. Prime (closing):* Dr. Blackwell's criticism is justified. His inference that I might advocate making a cavity all the walls of which were enamel is in error. I would not. If there was a dipping down of the enamel on the pulpal wall and it was solid and sound, I should cross over it into the dentin. This small amount of enamel on the pulpal wall can do no injury and has the advantage of aiding in pulp protection. These cavities are so narrow that they are very retentive simply from the flow of the gold against the walls, making them safe against dislodgment. No undercuts are necessary unless it be a convenience point in the starting of the filling.

# A NEW AND SIMPLIFIED METHOD OF PARTIAL DENTURE PROSTHESIS

By POLK E. AKERS, D.D.S., Chicago, Illinois

(Read before the American Dental Association, Dallas, Texas, Nov. 10-14, 1924).

IN considering the problem of the restoration of missing teeth in partial denture cases, I believe the following to be the paramount requirements:

1. That the appliance shall not occasion needless impairment of the abutment teeth either for the purpose of its construction or in its subsequent results in the mouth of the patient.

2. That it may be worn by the patient with comfort and safety.

3. That it be satisfactory from a cosmetic and esthetic standpoint.

4. That, with average care on the part of the patient, it will deliver a maximum of service; which implies that it must be so constructed that it will be easy to keep clean.

5. That, from an economic standpoint, it can be utilized by the person of average means.

This subject should be of more than passing interest to the dental profession for the reason that present day dentistry creates so many situations in which its employment is indicated and no other known method could properly be considered by anyone who has the faintest regard for the conservation of abutment teeth.

I will not, in this paper, attempt to review the history and evolution of cast clasp restorations. Suffice it to say that the profession, as well as the public, is under a deep obligation to these early pioneers, as their efforts have paved the way for what has been developed today.

Nevertheless, had this early situation remained stationary—had no progress been made to correct the faults and limitations of those early designs and the technic—I venture to say that few would contradict the statement that most cast-clasp work would today be but an unpleasant memory. We have all, I am sure, experienced that peculiar sinking sensation on seeing some of our early cast-clasp work a year or more subsequent to its installation—the abutment teeth in many cases etched and discolored and the proximal surfaces near the gingival margins ravaged by decay. I am free to say that I have had this experience a number of times, and I have devoted the major part of the past seven or eight years to research and experimental work to correct these defects. I believe I can claim a fair measure of success for these efforts.

It is not claimed for this work that it is a panacea for all partial denture requirements nor that there is not a place in dentistry for fixed bridge work. Indeed, there are many cases in which fixed bridge work, properly constructed, is indispensable.

However, I have no hesitancy in saying that, in the large majority of cases, the narrow cast clasp (one piece casting) type of restoration can be employed to the mutual satisfaction of the patient and the dentist. Common sense should govern the dentist in his decision as to

when fixed or removable work is indicated.

The principal points I wish to bring out in relation to my design and technic as compared with the early method are, briefly, as follows:

1. The casting of the entire case in one piece, directly to the model, thus eliminating the likelihood of the various component parts getting out of relation. This does away with not only a succession of impressions but also avoids a number of soldering operations, which subject the case to the possibility of being pulled out of relation. I cannot emphasize too highly the importance of this point.
2. The relief of the impression to restore proper interproximal space and avoid impingement on the tissue.
3. The provision for occlusal stops for every clasp.
4. Employment of the narrow, half-oval clasp, highly polished on the inside, covering a minimum of tooth.

### PRELIMINARY PREPARATION OF THE ABUTMENT TEETH

1. Polish well all teeth to be clasped.
2. Inspect carefully the abutment teeth for the most convenient place for occlusal rest. If no natural depression is present, make one as a counter sunk space, for occlusal rest is indispensable. One millimeter in depth is sufficient.

### IMPRESSIONS

1. Use only ordinary impression trays (not split trays) sufficiently deep.
2. Take the impression in impression material mixed thin with cold water and well spatulated.
3. Add salt to hasten setting.
4. Oil the tray slightly to facilitate removal of tray from impression while in the mouth.
5. Be sure to seat the tray well down toward the occlusal surface of the teeth, as this aids in breaking out the impression material.
6. Remove the tray from the impression.
7. It is generally better to start breaking out the impression by inserting the index finger over the buccal portion near the posterior border.

### ASSEMBLING IMPRESSION

1. See that the tray is free from any small particles that would interfere with replacing parts in their relation.
2. Place the parts back in the tray. Be sure that they are seated back in the tray, and seal to the tray with the base plate or bite wax (not sticky wax).
3. When the impression has been completely assembled in the tray if any slight cracks are present, do not at this time let the wax flow in but trim off from the model later.

### PREPARATION OF IMPRESSION

This is an all important step in this work. Trim out in the impression any undercuts that may exist adjacent to the abutment teeth. This is imperative for the reason that it permits the case to go to place and restores the normal interproximal space.

1. Paint the impression with solvite separating fluid while slightly damp, using two coats if thin and one if thick. If the case is absolutely dry place in the bowl of water momentarily, and then paint. Dab the cusps with the brush to prevent too much settling there.
2. Allow about five minutes to dry and then place in water while mixing the investment compound (No. 1).
3. Run the model with the investment compound. Use cold water, mix fairly thick, and after spatulating for a minute, place a lid over the rubber bowl and shake well to a fairly thick mixture. This dispels air bubbles and gives a uniform mixture. If this is properly done, you will obtain an exceedingly hard, smooth model.
4. Trim the model moderately (giving final trim after separation) and leave to set for one hour.
5. Place the model and impression

in a pan of cold water and bring to a boil with a low flame. The impression will dissolve, and the separator can be peeled off.

6. While the model is wet, draw the design with indelible pencil. Relieve the model if any teeth are to be butted.

7. Leave the model until perfectly dry (say, twenty-four hours) or place in oven at low heat for a short time; otherwise, the wax will not adhere to the model.

DESIGNING

1. Make cases as little complicated as possible.

2. Clasps, if kept narrow become practically self-cleansing. They must run just below the line of the bell of the tooth. This does not necessarily mean horizontally as this line is not always horizontal. Examine model from all angles for making the line of the bell of the tooth with a pencil.

3. Do not forget that a clasp can be opened or closed with pliers if necessary to strengthen or loosen the hold on a tooth. Do not make more clasps than necessary for retention. On the other hand, if unable to obtain a sufficient clasp hold for a case, carry on the extension to another tooth, and to this attach a clasp. In the case of a double or treble clasp, the clasps should taper off in width as they approach the embrasial hook, as this adds to the appearance. Use all means to get spring in the clasps; keep them narrow and somewhat delicate beyond the axial angles; have a narrow saddle attachment, and, when building lingual bar cases, build the bar to meet saddles and not clasps. Clasps must be as free as possible to get the necessary spring.

4. To prevent pressure on the tissues and also straining of the bridge, always place a "rest" on either side of a bridge. This applies to single anterior teeth in partial cases in which it might be overlooked. When a rest cannot be fitted on one side of a bridge, carry an extension to a tooth farther distant, and to this attach a rest.

5. Palatal bars give a greater feeling of security than horseshoe cases. but there are times when palatal bars cannot be used.

6. In the case of an upper with one abutment, a mean cuspid, use a palatal bar.

7. When all teeth are missing in the upper jaw except the second molars, a horseshoe case is indicated. A spring from side to side will aid retention.

8. For lower unilaterals, use an embrasial hook.

9. Keep a vulcanite attachment saddle to the lingual side. For these, use a 22-gage wax.

WAXING (FOR ALL GOLD LINGUAL BAR CASES WITH TUBE TEETH)

1. Before waxing up, see that the model is perfectly dry.

2. Warm the model slightly over a Bunsen burner.

3. Use for clasps, 20-gage wax; for saddles, 22-gage; for bars, 22-gage, two thicknesses.

4. Grind tube teeth to fit the case, but first decide as to whether they are to be butted. Then cone-shape the root end of the teeth with a porcelain finishing disk.

When they are ground, see that the teeth lie from 1 to 1:5 mm. below the line of occlusion, to allow for cementing.

5. Place the wax for the clasps (make slightly wider than sketched and reinforce axial angles to the occlusal rests if necessary); then saddles; then bar and wax together.

Cut a strip of wax from the saddle; i.e., the part to which wax pins are to adhere.

With a wooden toothpick, wipe glycerin over the teeth and within the pin holes.

Thread wax post (made by hypodermic syringe) or roll a wax pin through pinhole of tooth and form excess into a lump on under surface. Heat this over

the Bunsen burner and press on the model in correct position. Leave there; repeat with the next tooth, and shape with hot spatula when all the teeth are in place.

6. Fill in between the teeth and between the teeth abutments with wax, and smooth over saddle, adding wax on hot spatula if necessary. Do not overbox teeth.

7. Place the waxed model under cold water, remove and then carve with a sharp knife. Withdraw all teeth and replace. This is best done by holding the model with one hand and resting on the bench, and withdrawing with the other hand resting on the bench (for steadiness to prevent displacing posts).

8. Finish with hypodermic needle and flame. I use a Heidbrink waxing torch and then wipe over with china silk. Do not forget that it takes less time to work wax than gold and that less gold is wasted when finishing.

SPRUING

1. In nearly all cases, use only one sprue, made of base plate wax. If, however, in using only one sprue the gold has to "come back," it is safer to give "leads" to these points.

2. Make it amply large if a centrifugal casting machine is used. It may be as large as a slate pencil.

3. Attach it firmly to that part of the wax on the model that will give the molten gold the best opportunity for a direct flow. In lingual or palatal bars, cut away the model, making a hole through to the bar.

INVESTING

1. Select a suitably sized ring for a model; one larger than necessary means only a waste of the investment.

2. Soak the model in water until bubbling ceases.

3. Paint the entire model and wax pattern (using a thin mix of sheet of investment compound No. 1) to at least one-eighth inch thickness and get well around the attachment of the sprue. Do not rush this process, and use two mixes if necessary. Careful painting, like careful waxing, pays in the long run.

4. Rest the edges of the painted model on a glass tumbler and let set for at least fifteen minutes.

5. Mix investment compound (No. 2) to a creamy consistency, dip the painted model in this bowl, then fill the ring three-fourths full and wriggle the model into this.

6. Fill the ring (if necessary) to slightly above the rim and allow to set (say, forty-five minutes).

7. Cut a cone-shaped opening around the wax sprue to give the gold ample access and to act as a receptacle for excess when casting.

8. If there is any paper on the bottom of the ring, remove it, as this would to a certain extent prevent a free escape of moisture when drying in the oven, also hiding the blue of the investment, which indicates that it has not been overheated.

DRYING OUT AND CARBONIZING WAX

1. Heat the oven to 500 or 600 degrees before putting in the case.

2. Place the case in the oven sprue hole down. The investment will stand a great deal of heat while moisture is present.

3. After from thirty to forty-five minutes decrease the heat slowly until temperature reaches about 250 to 300 degrees. At this temperature bar cases will require at least five hours, bridges from two to two and a half hours. It is best, however, to leave all large cases about five hours at this temperature, and they will come to no harm if left over night. Before casting, however, be sure all moisture is out and the wax carbonized. If there is any doubt, test for moisture with a mirror and test for wax by holding a blow-flame over the sprue hole. If any wax still not carbonized remains, a hardly perceptible flame will be visible on removing the blow-flame.

Rounding and balling of the edges of the casting are due to moisture. A No. 2 investment is greenish. If this color is burnt out, the investment has been overheated.

CASTING (TECHNIC FOR CENTRIFUGAL MACHINES)

1. Place the ring on the machine and balance.
2. Place fresh asbestos foil in the crucible. This is important as it helps to retain the heat. Take another piece and double it; cut a hole in the center and place between the sprue hole of the ring and the inner front ring support. This makes a good seal, preventing throwing of gold out from between the ring and the attachment.
3. Heat the crucible before putting in the gold.
4. Use the brush flame first to melt gold, then the blue flame. Use no borax, as reducing flux is much better. Use a good blowpipe and play with the flame to find the correct distance for most heat. Cast when the gold gets smooth on top.

FINISHING

1. Cut off the sprue with separating disk or mechanical saw.
2. First prepare the clasps, using seven-eighths inch heatless stones and separating disks. (a) Get all length possible by trimming shoulder, to obtain necessary spring; (b) remove all undercut from the gingival side where there will be no spring; (c) stone the occlusal side of the clasp making the approximate required width; (d) make oval but leave plenty of thickness (especially at axial angles) for polishing, outside as well as inside. If not made too weak, clasps can always be bent to obtain higher grip if necessary.

Now finish the inside of the clasps, using: (a) gold finishing burs or hub-shaped stones; (b) sandpaper disks; (c) a felt wheel or piece of cotton wrapped around a fissure bur with tripoli on it; (d) repeat with a polishing compound; (e) a polishing disk.

If necessary to further trim, use porcelain finishing disks.

3. Buff with rag wheels (3½ inches) and a polishing compound.
4. Boil in a washing powder, and dab with brush.

TECHNIC OF CASTING TO BACKING STEELE'S FACINGS

1. Grind the teeth without their backings to fit the case (for temporarily holding tooth on model; when fitting, use a bit of soft wax).
2. Then put on gold backing (alloy backing should not be used), and trim with scissors. Then stone for close fit.
3. Criss-cross gold backing with separating disk to give suitable surface for attachment for casting gold. Another method is to put a spot of 18 carat gold solder on backing and then hold over Bunsen flame. This will act as a medium of attachment.
4. Remove the soft wax; place the tooth in correct position and then allow a little melted casting wax to flow in behind it. Remove the facing, moisten with saliva, replace, and then reinforce further with melted casting wax. See that the wax fills all interstices, and place a little extra along the incisal edge.
5. Be careful not to run the sprue too near the tips of the backings or the heat of the molten gold may melt them. I have seen this occur.
6. Steele facings are indicated for close or harsh bite; also in single anteriors in a partial case when there are clasps or rests or both on either side.

DISCUSSION

*F. Ewing Roach, Chicago, Ill.:* Dr. Akers has limited his remarks practically to laboratory technic, and while this is important, it is secondary in importance to designing the appliance. Selection of the proper type of restoration and its design in every detail has more to do with the ultimate success or failure of a case than anything else. The dentist who undertakes to supply removable partial dentures for his patients is often confronted with engineering problems of no small proportions, and because such a large percentage of the profession assign the actual construction of

these cases to the laboratory man, it becomes all the more important that the dentist have a better understanding of the engineering principles involved, in order that he may more intelligently direct the building procedure. Twenty-five years of close personal contact with graduate and undergraduate students has convinced me that only a small percentage of the profession are sufficiently interested in the laboratory end of this technic to master it. What we most need is a better engineering sense, better impressions and a better understanding of the installation and maintenance of these removable restorations. The busy dentist of today is depending on some good technician for most of the work referred to by Dr. Akers, and this is as it should be, provided he (the dentist) draws up the plans and specifications. Every dentist who undertakes to supply removable appliances knows that the requirements are more exacting than in the fixed type. Every step from the preparation of the teeth and the mouth generally, to the installation of the case, calls for the most painstaking consideration. The procedure, considered as a whole, may be divided into two parts—the operative and the constructive. The operative part comprises the preparation of the teeth and mouth generally, fitting any and all abutment pieces and attachments; the taking of impressions and bite, and finally installation and maintenance. The constructive part consists in the laboratory work—the manufacture of the appliance. These two departments must coordinate if satisfactory results are to be obtained. Dr. Akers has gone into detail regarding materials employed in his technic, and he leaves the impression that these particular materials are essential to success. Such is not the case. Many other equally good, and perhaps better, materials are available for the same purposes. The important thing is to learn to manipulate properly some standard materials put out by a reliable manufacturer, and stick to them. I agree that a disappearing plaster should be employed for taking impressions. Regarding the preparation of the teeth, the profession must come to a realization of the fact that the successful employment of cast clasps depends to a large degree on preparation of the teeth to be clasped. This involves the preparation of occlusal rest areas and the removal of excess contours wherever they interfere with proper results. In this connection, I want to refer to the preparation of the occlusal rest. If I understood Dr. Akers, he stated that the relief for the tooth for the occlusal rest should be from 1 to 2 mm. This, to my mind, is a very extensive and an unnecessary mutilation of the tooth for the occlusal rest. You will encroach upon the dentin, and in most instances into very sensitive areas of the tooth. A depth of one thirty-second inch for the occlusal rest relief is ample for any case. I want to emphasize the importance of sectional construction, taking impressions in sections, casting and building the larger cases in sections. The entire procedure is much simplified and the finished results incomparably better when this plan is followed. In this regard, I disagree absolutely with Dr. Akers. I do not agree that the plan of taking impressions for these larger and more complicated cases and casting them in one piece is the better; the procedure is much simpler and, in my experience, the results are incomparably better when sectional construction is followed. I know of no other plan whereby we can secure equally good results in these larger castings. The inherent physical properties of these gold alloys, the shrinkage and warpage that takes place in the larger cases, make it impossible to obtain the same accuracy of adaptation that is possible with the sectional construction. Surely any of the larger bilateral cases can be easily cast in one piece, but distortion from shrinkage and warpage cannot be controlled so well as by sectional construction. For many years, I have followed this plan exclusively and today it is an accepted practice by many of our best operators. Most of the unilateral cases are cast in one piece, and, for the short span bridges, the clasp, saddle, floor and pins for porcelain pontics are most satisfactory when cast in one piece. In taking impressions of these cases, my preference is for separate impression taking. I prefer to place the material in the mouth with a sectional tray in such a manner that I can withdraw it from the mouth without breaking it; building the impression in the mouth so that, when I take the sections out of the mouth, I have one or more of the unilateral cases, usually only two parts, with clean, well defined predetermined lines of separation. When the impression is taken *en masse* and is broken out, it is difficult to get these parts back into their proper relation. It is a simple matter to take these impressions in sections, designing the impressions according to the draw of the cast, so that there is a definite line of demarkation in the line of separation between the sections. The relief of the impression as outlined by Dr. Akers is an important one. We should make relief of the impression around the gingival areas. This is one of the most flagrant mistakes that has been made in the construction, of partial cases. The design of the clasp is an important thing. In Dr. Akers' illustration, the clasp was too short, in my judgment, to assure the greatest possible benefit of retention and reciprocal bearing of the clasp. The latter should be longer, extending entirely around the tooth, to give more flexibility. In these short span cases, unilateral or double clasp

short span cases, it is a simple matter to cast them in one piece. I cannot reconcile the employment of vulcanite in combination with gold in these short cases. We cast saddle, base, floor and pins in one piece—the teeth are then cemented to place and the pieces finished in less time and with far better results than when vulcanite is used. So, for this class of cases, I do not see any occasion for the employment of rubber. Neither do I see any occasion for the employment of rubber in a great many of these larger cases. Let us make as many of these castings as possible in gold. Unless we have a considerable amount of restoration to make, we can make them of gold just as easily as we can make the combination of gold and rubber. Design the clasps as simply as possible; don't use too many clasps; select the tooth to be clasped in a way that will assure a balanced relation and a balanced seating of the cast, and avoid complicating the case by too many clasps and by breaking up the appliances into a great number of small arms and extensions, filigree work, so to speak. I am in favor of the use of plain simple lines as much as possible. I do not agree with the idea of making these cases when we have teeth posteriorly, as shown by Dr. Akers; when we have teeth out on both sides of the mouth and teeth posteriorly connecting, thus making them into one appliance, using a palatal or lingual bar posteriorly. Better and more satisfactory results, in my judgment, are obtained by the construction of the sides of those cases in two separate bridges, unless the stabilizing effect of a bar, connecting the two sides is needed; unless those teeth are weak and there is a poor ridge and the position and condition of the ridge and of the teeth, etc., would indicate that there would possibly be too much strain on these teeth in a simple unilateral construction. My preference, in a great majority of these cases, and I find it preferable to the patient, is to make two separate cases rather than to connect them with any form of bar. With reference to "diagnosis": We are not making diagnoses in these cases. It is not a matter of diagnosis: we are confronted with engineering problems. It is a survey, a study of these cases to determine the design, which is important. The selection of the proper material is important, too and my belief is that we should use more gold for these cases. There is no question about the superiority of gold over rubber. I do not agree with Dr. Akers' plan of using sheet wax for the pattern for clasps. The wax is more easily built up to outline and required thickness by carrying melted wax to place with a suitable spatula. It is not desirable to have clasps of a uniform thickness throughout. They should be heavier at the juncture of the clasp to saddle, gradually thinning down to the end. Cast clasps, when properly designed and placed, are preeminently the most universally applicable means of anchorage, and, under sanitary maintenance measures, will give long comfortable service, without injury to the teeth. Accuracy of fit, occlusal rests, reciprocal bearing, the polishing of the inside surface, accurate relationship between clasp and saddle and persistent maintenance measures are essential to success with the cast clasp.

*Dr. Akers (closing):* Dr. Roach goes right into the sectional method of taking impressions. I believe you can take an impression with a full tray and get a perfect impression without going to sectional trays. If any of you have ever built a complicated partial denture and tried to solder that case together, you have had a lot of fun. Now, I believe that it is impossible to assemble a case and consider getting a good fit; you can by the one-piece casting. You talk about contraction of gold. There must be some, I admit, but if you can't find it and the case goes to place in the mouth without the slightest discomfort, what more can we ask? Think what different steps that eliminates. Suppose we are making a lower lingual bar case; by casting the bar and clasp separately, how are we going to keep these various units in their proper relation in the mouth while getting the impression? We can never be positive. I have seen these complicated upper cases, with a saddle on one side and just a bridge on the other, assembled three or four different times by good men.

These cases happen to be made by one of the best laboratory men I know, but they never fit at the heel, and if you haven't a perfect fit in a partial denture, you will find it out. I don't think it is possible to solder them and get a perfect fit.

Dr. Roach spoke about my clasps being short. I don't think they are short. Take a lower lingual bar case—suppose we build that clasp to go all the way around the tooth—that we have giving tissue at the heel—what happens when this tissue gives down slightly? You have more strain on that tooth by gripping all the way around than if you use a shorter clasp—it gives more spring to the clasp. What I am trying to do is to build a clasp that, when there is pressure on the tissue, is not going to cause a strain on that tooth, and I believe that a clasp that goes all the way around is going to cause, to a certain extent, the uprooting of that tooth.

# THE HEALTH OF THE DENTIST AND HOW TO PRESERVE IT

By E. H. CARY, M.D., F.A.C.S., LL.D., Dallas, Texas

(Read before the American Dental Association, Dallas, Texas, November 10-14, 1924)

THE average, vigorous, prosperous, active man is distinterested, except in the abstract, in his own health, cannot be stampeded into a state of mind that is essential, if he is to apply any suggested change of habits. In a vague way, the subconscious mind may raise a momentary query, such as "How is it with me, and whither am I drifting physically?" But the thought is easily pushed aside by the exigencies of the day.

In a long experience with medical students, I have observed that the reaction of the embryonic doctor to lectures involving the vital organs frequently results in his taking stock of his physical well-being, with more or less fear manifested as to the soundness of his health. This question, at first, is an absorbing personal study, but the prospective doctor finally learns to laugh at his imaginary ills, and ceases to apply his knowledge, as he acquires it, to the study of himself, becoming interested in disease and the application of his knowledge to the rest of humanity.

In all probability, all members of our two professions who have studied disease have had more or less similar experiences. An association of ideas involving such comprehensive studies of symptomotology leads to that state of mind wherein one can drift, physically, into a complicated condition before he will stop and give heed to his physical needs; familiarity, in this case as in many others, being the mother of contentment.

The layman has a similar experience. He reads a patent medicine advertisement with a long list of symptoms and proceeds to diagnose his case. He uses the aforesaid medicine and with a consistency quite human his mental condition is relieved. He thinks the medicine has cured him and he is prepared to write a strong testimonial, interesting to the suffering world, although laughable and pitiful to the scientific mind. Later, he finds himself the victim of a real disease, which he attempts to treat, emphasizing symptoms of no importance, delaying the hour of a correct diagnosis, wasting precious time that could have been used to restore his health.

The question of interest in one's own health is altogether a new subject, and outside a few individuals here and there, has no particular source, unless it can be traced to some wise and crafty organization such as an insurance company.

It is natural that this should be true; for have they not sold the promise to pay on the history of past mortality figures? They know that the longevity of the human race is to their advantage, and it is only another step forward for them to apply the accumulated knowledge at their command to the careful rechecking of the health of the insured, and to apply common sense principles in correcting the mistakes and the blunders of in-

dividuals whose lives can be materially lengthened, when the insured are thus warned and advised.

The life extension institute is seriously condemned in many quarters, largely I believe, as to methods employed to bring the public to realize the value of yearly examinations; but we all agree that our bodies can be better directed, as any machine could be, if a record of its condition from year to year is made, and the treatment instituted can be checked and rechecked. Our common sense would teach us the value of yearly examinations made by one sufficiently competent to know and sufficiently interested to suggest a plan to be followed by the patient. As the examining physician aptly puts it: "Do not make the care of your health a fad or hobby. Acquire knowledge of healthful living habits, and adopt them normally and naturally. If you do this, right living, in a physical sense, will become automatic and without conscious effort on your part."

Thomas Carlyle, in his essay on Sir Walter Scott, after describing Scott as an eminently well-conditioned man, healthy in body, healthy in soul ("we will call him one of the healthiest of men"), states further:

> Neither is this a small matter; health is a great matter, both to the possessor of it and to others. On the whole, that humorist in the Moral Essay was not so far out, who determined on honouring health only; and so instead of humbling himself to the high-born, to the rich and well-dressed, insisted on doffing his hat to the healthy; coroneted carriages with pale faces in them passed by as failures, miserable and lamentable; trucks with ruddy-cheeked strength dragging at them were greeted as successful and venerable. For does not health mean harmony, the synonym of all that is true, justly ordered, good; is it not, in some sense, the net-total, as shown by experiment, of whatever worth is in us? The healthy man is the most meritorious product of Nature as far as he goes. A healthy body is good; but a soul in right health—it is the thing beyond all others to be prayed for; the blessedest thing this earth receives of Heaven.

In our day, to guard our health, the medical profession has advocated a department of health, to be headed by a cabinet officer, realizing that this would accentuate the importance of health standards, would control all the health agencies and propaganda of every kind that would tend to elevate and magnify the physical needs of the human race. It may prove interesting to refer to Hippocrates, at this point, for some of the fundamental reasons why a people will not be tied to the best known health standards. The law of Hippocrates, written twenty-four centuries ago, is strangely applicable today. Of the four or five interesting paragraphs making up this so-called law, I shall quote the first:

> Medicine is of all the arts the most noble; but owing to the ignorance of those who practice it, and of those who, inconsiderately, form a judgment of them, it is at present far behind all the other arts. Their mistake appears to me to arise principally from this, that in the cities there is no punishment connected with the practice of medicine (and with it alone) except the disgrace, and that does not hurt those who are familiar with it. Such persons are like the figures which are introduced in tragedies, for they have the shape, and dress, and personal appearance of an actor, but they are not actors, so also physicians are many in title, but very few in reality.

As Hippocrates saw the situation in his time so it is today, with little change. It is no longer true that our art is far behind all other arts, as Hippocrates stated, but it is true that publicly the recognition is delayed by that vast number of persons whose claims seem so ridiculous yet mean much to thousands; and there is still no adequate punishment for pretenders, just as then. We realize that the public has grown so accustomed to discoveries and inventions that anything printed, regardless of its novelty, or lack of merit, is accepted by the multitude as true; and, while this is flattering, the pretender thrives in that underworld, the zone just removed from the scientifically true; and in this under-

world thrives that vast group of cultists and practitioners of all kinds who expound and practice near-truths.

It is left to the specialists in medicine, such as yours and mine, to demonstrate with scientific accuracy the things applicable to human need, which form in their way a part of the chain of evidence capable of sustaining the practice of our art and science, prodded here and there by pseudoists of all kinds.

Here I recall that I was invited to read a paper on the subject of the health of the dentist, and how to preserve it; and I am reminded in this particular of a question asked by a cultured and refined lady of a remarkable old surgeon of four decades ago, Dr. Lewis Sayres. She inquired of him as to the best method of preserving her health, and in direct words, he replied, "Madam, keep your feet dry and your bowels open."

The instructions of Dr. Sayre are simple and for the dentist, housed as he is, should be 50 per cent effective; for he ought, at least, to be able to keep his feet dry. This brings us to the sedentary habits that naturally result from the dentist's work; and it reminds me of an incident, occurring fifteen years ago, when a doctor of the old school met me in the corridor of an office building where we awaited an elevator and startled me by exclaiming: "I shall bury you yet—you office men—shut in from God's great outdoors."

At that time, our golf club was not used as it is now, and for one of our profession to have indulged in a game would have been looked on as a waste of time. It would have seemed a discourtesy to his clientele for a doctor to be out of his office for an afternoon of pleasure—and deemed ridiculous for him to have pleaded the necessity for recreation.

Our professional men who are physically able to do so could well afford to take the time every week for that complete change of their horizon and the physical and mental thrill that comes sometime during the game. The percentage of dentists who play is low at the present time. They, too, will have to develop the right mental attitude on the part of their patients and join the increasing band of golfers. As Epictetus said: "Try to enjoy the great festival of life with other men."

In this age of intensive living, of indoor life, and what appears to be a fierce competition in professional life, social exactions, insufficient rest and sleep, not taking the time for physical exercise and mental diversion, these and other influences make such strenuous demands on one's vitality, one may grow old too soon. You recall the often repeated statement that one is as old is his arteries. Modern demands on us, when not held in abeyance, frequently change the course of an artery. You will understand the pathologic significance of this expression.

While on the subject of recreation, doesn't your common sense tell you that to break-away once or twice a week is far better than to go through a hard year with the hope of two weeks of away and roughing it? I do not deny the good of the latter, but let the battery be renewed far oftener than by this yearly get-away.

The city practitioner finds his minor recreations and diversions in the theater, in billiards, hunting clubs, swimming, hand ball, boxing and fencing at the gymnasium. In season, tennis, for the younger and more athletic, horseback riding, the finest exercise, if frequently utilized, along with golf—these things offer ideal hygienic and recreative features, and from them many business men find a psychic and physiologic tonic which enables them to obtain a high-grade working efficiency.

The problem for the dentists in the smaller cities and towns is to overcome that mental obsession which they possess, that they can't take recreation, in

deference to the public point of view—they must always be ready to respond to calls for service.

Largely through habit, deluded by false conception of duty or subdued by fear, the average professional man stays in the rut till hardened vessels or nervous affections clear his vision, and he sees too late the error of his ways.

Voltaire has always interested me. He lived to be 83 years old, but there was a great variety of interests in his life. He said: "One must give himself all the occupation he can to make life supportable in this world. The further I advance in life, the more I find work necessary. It becomes in the long run, the greatest of pleasures, and takes the place of the illusions of life."

It has been said that Voltaire was to France what Calvin, Luther and other great reformers were to their countries; but this side of life was more or less incidental as compared with the great capacity of the man to delve into all forms of learning, mastering everything that was known and then striking the established opinions with the keen-edged sword of wit and satire, shifting the attitude of the period from one of worshiping established order into that of creative thought and action, which basically brought on the French revolution. He lived to the age of 83 years, and played his part well to the last day. As a result of a life full of action he lived to see the reformation; and when you recall that he was a physical weakling, the exercise of this vigorous brain, where dull thoughts could not exist, in a measure suggests the influence of mind over matter. We have many other examples of active brains in bodies grown old, but the spark of life is rekindled by the illuminating influence originating in mental activities. So we professional men can cultivate a variety of mental interests, extending to the arts and sciences, however expressed, and gaining strength and happiness in our daily contacts. Modern dentists have the basic education to build this edifice of cultural interest in the world's past, present and future and to enlarge their horizon.

Bacon says: "It seems to me that men do not rightly understand either their store or their strength, but overrate the one and underrate the other. Hence, it follows that either from an extravagant estimate of the value of the arts which they possess, they seek no further; or else from too mean an estimate of their own powers, they spend their strength in small matters and never put it fairly to the trial in those which go to the main." And for this reason and many others, we can agree with Alexander Pope in his essay on "Man" when he says:

> Reason's whole pleasure, all the joys of sense,
> Lie in three words, health, peace and competence.

## DISCUSSION

*Thomas B. Hartzell, Minneapolis, Minn.:* Dr. Cary has led us into fields of thought that will benefit every single member of our profession. As I deal with the dental profession through the years, I am impressed with the idea that we, as a class, have neglected the cultural value of the classics of literature. Most of us, when we get together, discuss our immediate interests, which lie in dentistry, and most of us when we go into practice and attain a place in society, hold ourselves so closely in the groove we plow that we feel we never can leave our work to go out and get contact with the sky, the sun and Nature, and God as revealed in these things; and we grow, or tend to grow, narrow. Dentistry is a vocation in which we are continually dealing with minutia, until minutia becomes endowed with enormous size in our cosmos and we lose sight of the greater things that wonderfully benefit us. If we were to follow the suggestions in Dr. Cary's paper, every single member of our profession would be benefited in one way or another. And the practical suggestion of taking careful stock of our physical defects and needs regularly is of vital importance. No dentist can afford to go through life neglecting himself. It is quite true that we should not magnify things in our minds, but a common-sense bi-yearly examination of the body should be had by every professional man, and he should put himself in the hands of some good professional brother who will guide him in his activities. We dep-

recate operating on our own friends and relatives and we should not attempt to guide our physical course in life; we should have the advice of a skilled physician who will order along general lines the course that we should pursue and who will guard us in the beginning from those ills that creep into life without our knowing it.

*Thomas P. Hinman, Atlanta, Ga.:* You hear from the secular press that the length of life has increased in this country, or in the world, about an average of from eight to ten years. If you investigate this statement, you will find that this increase has occurred among the babies and not among adults. The average life of the adult has been shortened because of our environment and our habits. If the same attention was paid to hygiene and nutrition of adults we would have a corresponding increase in length of life of the adult.

Someone has said that the doctor who treats himself has a fool for a patient and I have thought that remark trite and true. If we, as dentists, attempt to treat our own teeth, we have fools for patients. The physician is always anxious and willing to cooperate with us in all our work and we are anxious about the health of our patients and yet we constantly neglect our own health. There is no profession practiced today that requires the health of its members to be at the highest peak, so that his nervous system and his touch and his mental activities may be well conditioned, as does dentistry.

It is very interesting to note that some Orientals, the Chinese, pay a physician only when they are well. If the dentist will pay his physician when he is well and strong and can earn enough to pay him, then he will necessarily run less chance of being ill, because when he is ill, all of his work ceases, and his income, of course, is greatly diminished.

It has been my own rule for the last eleven years to have a complete physical examination twice a year. It is surprising what will take place sometimes in six months. Eleven years ago, I was found with a blood pressure above normal. I took this to heart and followed the directions of my physician, and week before last, when I had a physical examination, (I am now nearly 55 years old) I had a blood pressure of 132. The average man at that age will have a blood pressure of 160, and I have seen blood pressure as high as 225.

Now this all means something. It means that arteries may be hardened and if you as dentists try to teach your patients young and old to take care of their teeth and you neglect to take care of your own and your health, how can you expect to impress on them the necessity of taking care of their health and their teeth? We are practicing preventive dentistry; why not practice preventive medicine on ourselves? The matter is not how young you are or how old you are. You want to know what your physical condition is. Use intelligence, and govern the work that you do in accordance with your health.

I have been much interested in what Dr. Cary had to say about golf. I have found that since I have played golf my efficiency has increased so that in my morning's work, and I work only from eight until one, I am able to accomplish more successful dentistry than I was able to working under the old seven and eight hour system, and my income instead of decreasing has increased, simply because I found after years of practice, and I have been practicing nearly thirty-five years, that in the afternoons the work that I did was not of the type that I did in the morning because my physical faculties and mental reactions had all been dulled by the continual day-after-day hammering, hammering, hammering.

The question of nutrition should come in here, and I believe today that the question of nutrition plays one of the biggest parts in our health. It must do it. If you take an automobile engine, and you probably all have an automobile, and feed it plenty of oil and gasoline and leave out the water, it burns up, doesn't it? And if there is no gas in it, it doesn't run; and if there is no oil, it won't run, and yet we are continually eating a diet that is so unbalanced that you might say you have left your oil, or water or gasoline out. We are living day after day using certain types of foods, not taking a balanced diet, and the old machine is wearing out just twice as fast as if we had eaten a properly balanced ration.

This question of the dentist's health is one that should receive the attention of every thinking man. We all want to live long. If we don't, there is something wrong with us mentally.

I am reminded of what Cecil Rhodes said, that man who formed the empire of the English in South America. He didn't die an old man; he was comparatively young, but he burned the candle at both ends and he paid the piper and what he said was this: "So much to do and so little time in which to do it."

*Arthur D. Black, Chicago, Ill.:* I feel that I play all the time, because I enjoy what I am doing all the time and any work can be made play if you do it that way. I may put in a good many hours a day but I never put in so very many hours a day on a single job. If you have two or three jobs, each one is an avocation. In other words, the change of work can be made worth while from the health standpoint, both physical and mental.

A professional man should have, in addition

to his vocation, at least one avocation. It makes little difference what your avocation; you should have interest in some one thing, or in more than one, outside of your vocation. It gives that mental change and rest which every professional man needs.

Insurance statistics show that the dentist on the average dies about five years earlier than men of other professions. This is a matter which each dentist should take seriously to heart and should endeavor to analyze in terms of his own situation. The answer Dr. Cary has given you.

I am a member of a committee of the Illinois branch of a national organization to promote periodic health examinations for all individuals. This organization is promoted, in the main, by commercial interests, by large industrial concerns, because they have found that the services of their employes are worth more to them if they are in good health, and that it is an economy to employ good physicians to make a thorough physical examination of each of their employes at least once a year.

If that is a good thing for an industrial concern, if it is a good thing for their employes, it certainly ought to be a good thing for professional men, and I can think of nothing that the dentist can do that would be of more value to his patients and to himself than to do his bit in the promotion of this educational scheme for the better health of this nation. We should not only suggest this to our patients; we should be sufficiently interested in our own health to have a thorough going physical examination at least once each year.

I have been interested in the discussions in connection with this very problem by both medical and lay men, in which they have recognized the tremendous progress that dentistry has made in the education of patients to periodic mouth examinations. Whether we quite realize it or not, we have educated a large number of our patients to come to have their mouths examined at regular intervals, regardless of whether they are suffering pain or not. That same principle ought to apply to the general physical examination of every individual, and we ought to promote it in every way that we can.

*Dr. Cary, (closing):* Man as a healthy, robust, we would say normal individual has been a source of pleasure to the rest of humanity; that is, his contacts have brought pleasure, and when we think today how we disregard health because of the competitive features of life, or at least imaginary competitions, how we deny ourselves the opportunity of making ourselves as strong, as robust, as fine, as we ought to be, we realize how far we are departing from worship of health as practiced by the ancients. We have treated the question of health as a thing to apply to some one else, and we have disregarded its laws as applied to ourselves. Particularly has that been true of the professional man. I have worked myself all my life far too much for my physical well-being. Dr. Black has found surcease in variety, yet that too can be overdone.

# DEPARTMENT OF DENTAL HEALTH EDUCATION

## THE DENTAL HYGIENIST AS A FACTOR IN PUBLIC EDUCATION

By W. O. TALBOT, D.D.S., Fort Worth, Texas

(Read before the American Dental Association, Dallas, Texas, November 10-14, 1924)

IT is my purpose to show first that the dental hygienist is a most important factor in public education; second, that public education is the greatest field for service by the dental hygienist.

Public education is commonly understood to be that which is provided through the public schools. It is therefore in this relation that the subject will be discussed.

The matter here presented is not based on original research and experience; it presents the conclusions reached after a study of recent articles dealing with the dental hygienist and reports of school dentists, and those drawn from personal observation of work being done by dental hygienists and nurses in the public schools.

The public school was established primarily for economical mental training. In its later developments, it gradually reached out to support and, in a large degree, to supplement the moral training of the child in the home.

In more recent years, as the centers of population grew and became more crowded, the schools were more conveniently located, and as the children had less distance to walk to school, there was insufficient exercise for normal physical development.

Then came the demand for athletics to supply the deficiency in exercise and to assist in building stronger and healthier bodies. This demand has grown to the extent that educators and boards of education are recognizing the fact that, in order for a child to grow into a well-developed and well-balanced man or woman, and to become the most useful citizen, there must be a balanced relation between the mental, the moral, and the physical development.

In Nature's order, there must be physical well-being on which to build a mental and a moral structure. There must be an ever-watchful care in the development as well as in the preservation of the physical, the mental and the moral being.

In present-day living, the principal factors that produce physical well-being are plenty of fresh air; proper food, clothing and exercise, and hygiene. Hygiene of the body particularly adds to its comfort and contributes largely to the prevention of many diseases. This truth is especially applicable to hygiene of the mouth.

It has long been recognized by the dental profession that cleansing processes applied to the teeth and gums aid in the preservation of their health and

beauty. Yet they did not fully understand the reason why, until Miller gave to the world his findings on the bacteria of the mouth in 1890.

When the test was made in Cleveland, about twenty years ago, with a class of delinquent school children, the value of mouth hygiene, reparative work on the teeth and proper food was clearly demonstrated as influencing the mental and physical development of these children.

The need for reparative work on teeth may be largely prevented by early attention to mouth hygiene and proper food, both of which may be taught the child and should be taught the parents before the child is born. Hence, mouth health, among civilized people so far removed from Nature's way of living, is resolved into one of education.

While this truth has long been recognized by the dental profession, the question has been how best to reach the masses. As with many other educational problems, the means of solution appeared to be the schools. In many states, chapters have been inserted in the school physiologies dealing with the development and care of the teeth and mouth. Many supplementary readers and tracts have been used. Doubtless, the use of such books has accomplished some good, but the method was indefinite, and there was no way of checking up the results or determining whether any of such teaching reached the home.

School teachers have not been specially trained to present properly the subject of mouth hygiene and correct diet, and with the many other subjects requiring their attention, it could not be expected.

Then came the dental hygienist to demonstrate and to teach. Special schools have been established for their training, and universities have provided a course for their instruction.

Many articles have appeared in the dental journals in recent years giving reports of work done by dental hygienists in public schools, both alone and in conjunction with the work of the school dentists. Invariably, the results reported have more than justified the employment of the dental hygienist and the dentist in the prophylactic and reparative dentistry accomplished, both as preventive measures to the individuals served and as educational propaganda in the value of prevention.

In the most striking article of recent date[1] dealing with the work of the dental hygienist in public schools, Dr. A. C. Fones presented in a most interesting way the work accomplished in the Bridgeport schools since 1914 from the dental health point of view. He shows clearly that the dental hygienist's work may be extended to have an economic and educational advantage. His suggestion of an outline for a public school health program is heartily approved. He makes provision for a public school hygienist to conduct physical examinations, prophylactic treatments and special health education. Such a plan is a step forward in the educational value of the services of the dental hygienist in the public school work.

The report of Dr. Jack Stringfellow, supervisor of the department of mouth hygiene of the Fort Worth public schools, for the years 1922-1924, furnishes some valuable statistics showing the results of work done in those schools. The department was established three years ago. The examinations were made by the school dentist and the findings recorded by an assistant. The followup work of sending copies of findings to the parents and of getting the children to the dentists and checking up on the return cards was done by the school nurses. Health lectures and teaching including the care of the mouth and the giving of merit stars for daily brushing and for clean mouths was done by the teachers. Children of the lower grades

1. Fones, A. C.: The Public School Hygienist, J.A.D.A., 11:299 (March) 1924.

were given a printed pamphlet, prepared by the school dentist, containing instructions for the home care of the teeth and advice to the parents concerning the loss and eruption of the deciduous and the permanent teeth; the importance of regular visits to their dentists for examination and prophylaxis, and the necessity of preserving the deciduous teeth until the proper time for their loss.

The examinations in 1922-1923 were made in thirty-one white grade-schools. Of 10,130 children examined, 4,918 had defective mouths, or 48.5 per cent; 995 were treated by the school dentist; 1,470 reported treatment by private dentists, which made practically a 50 per cent correction.

In one school, 700 children were examined; 275 showed defective teeth; 238 were treated by private dentists, and only two applied to the school dentist for treatment.

Examinations in 1923-1924 were made in forty-five schools, including four high schools and nine negro schools. Of 21,013 children examined, 3,860 showed defects in permanent teeth; 4,545 showed defects in deciduous teeth and 1,583 needed prophylaxis and treatment of the gums, which made practically 47.5 per cent of defects in the number examined. However, owing to the classification of defects overlapping because there was more than one kind found in a mouth, the percentage of mouths showing defects to the total number examined would be greatly reduced. There were 1,282 children treated by the school dentist, with a total of 2,946 operations. No effort was made that year to keep a record of the children who went to private dentists for treatment.

In his last report, the supervisor recommended the employment of a dental hygienist to teach mouth hygiene to the children in the lower grades, give dental prophylactic treatments in the several school buildings and supervise the sending of children to the dental clinic.

These reports show an immense amount of work accomplished by one school dentist, and while the value of the prophylaxis, reparative service and treatment to the individual children cannot be estimated, those of us who have watched the effect of this service in the schools know that the educational value to the community cannot be measured. The service has been sold to the school board, the health department of the schools, the local medical society and the entire community. The need now is for the dental hygienist or the "public school hygienist," as Dr. Fones would call her, to step in and take her place.

Being particularly interested in this subject, I visited the Northwestern University Dental School, while in Chicago last May, and observed the training being given the dental hygienists, in preparing them for work in the public schools. Visits were made to the public schools to see the dental hygienists at work in teaching and in making examinations of the children's mouths.

It was especially interesting to note how much the children remembered of the essentials in a single lecture given a month previous on mouth hygiene and diet.

In the system as employed there, five dental hygienists work in one building at a time, making three visits in succession about one month apart. On examination of the statistics for two schools, with a total of about 2,000 children, the records showed in one school, on the first visit, 80 per cent defectives; on the second visit, 55 per cent; and on the third visit, 40 per cent. The other school, in a less favorable locality, showed, on the first inspection, 90 per cent defectives; on the second, 72.33 per cent; and on the third, 52.87 per cent.

The pupils of these schools were referred to their family dentists, or to some dental clinic, for corrective treatment and prophylaxis. The results ob-

tained in these schools in from sixty to ninety days, according to the statistics, were marvelous, demonstrating what may be accomplished by the dental hygienist as a health inspector and teacher.

The dental hygienist and her work is attracting attention throughout the country. The message is being carried by the daily press, in professional journals and in magazines, by the medical and the dental professions, nurses, dental hygienists and teachers. The public has accepted the service and the demand for the dental hygienist in public work is now beyond the supply. The dental profession has created the demand. It is now up to the profession to supply it, or to assist in every way possible.

While a study of the efforts being put forth throughout the country for mouth hygiene shows a widespread interest, it also shows a lack of uniformity, which is evidence that it is yet, to some extent, in the experimental stage. Therefore, there should be an effort made by the dental profession to standardize the training of dental hygienists for public school work.

If the name, "public school hygienist," and the work suggested for her by Dr. Fones should prove to be the most acceptable, beneficial, and economical to the public, then that plan should be followed.

When the question of standardized training is settled, there should be little difficulty in securing uniform legislation in the several states, regulating the services of such hygienists and making provision for their training through the educational system of each state.

The American Dental Association should assist in solving these problems through its Council on Mouth Hygiene and Public Instruction.

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# COMMUNITY OBLIGATION OF THE DENTIST

**By C. J. HOLLISTER, D.D.S., Harrisburg, Pennsylvania**

(Read before the American Dental Association, Dallas, Texas, November 10-14, 1924)

IN THIS day of great technical and research development by the dental profession, there is a line of activity that has been sadly neglected by the majority of dentists of the nation and that is preventive dentistry by education of the laity to the value of proper nutrition, mouth hygiene and periodic examination by the dentist.

The purpose of this paper is to show the individual dentist what he owes to the community in which he lives and how he can fulfil that obligation. The progress of the profession in the past generation has furnished a real opportunity for the dentist to be a source of information on proper diet. The results of investigations by McCollum, Grieves, Howe, Toverud, the Mellanbys, Wiley and many others have shown conclusively that what we eat has much to do with our physical well-being. Animals do not have toothbrushes, nor do they have toothache; and, further, animals living in their natural environment do not suffer from disease; they die a death of violence or of normal old age, and when they die of old age, they do not fail in any one part or function, but rather fail in toto, passing like the "one horse shay."

We, in our present high state of civilization, look on statements of nutrition research investigators with little or no concern, classifying them as alarmists or extremists until, in individual cases,

we are forced by lowered vitality or loss of function to adopt their doctrines, and after a period of strict adherence to their advice, we find ourselves benefited almost beyond belief. Then, because of our personal experience, we become ardent disciples of the truth of proper and balanced dietary. Nutrition is beyond question the foundation for health, mental and moral development, and with these undisputed facts before us, why should we not prepare ourselves, in a capable manner, to do our part toward educating the lay public to the importance of proper foods?

The value of prophylaxis and dental correction was first brought to our attention by the experiment made by Ebersole and his associates in Cleveland, in 1913, and substantiated wherever this type of work has been established. This experiment proved conclusively the relation of a well cared for dental apparatus to physical and mental ability. Here I want to call your attention to the fact that the twenty-seven children who took part in this experiment were also instructed in proper diet, and their mode of living was kept up under supervision by frequent home visitation. This brings out a point that applies to the majority of educational dental programs. The activities with which I have come in contact are not confined to prophylaxis or correction of dental defects but are a part of the general health program. The Bridgeport plan is a fine example of the broadness of application of the services of the dental hygienist. There they augment the work of all other health and hygiene agencies in the schools.

In Hanover, Pa., during a four months' campaign for correction of dental defects among the children attending one school of that borough, 315 were examined, and those needing dental service were urged to have necessary work done by local dentists, of which there are four. The checkup at the end of four months gave the following result: 230 children returned certificates signed by their dentist; forty-eight had work not quite completed; thirty-seven, chiefly in the primary grade, did not visit a dentist. This result was accomplished by following the plan of Miss Gladys Eyrich, who obtained 100 per cent perfect teeth certificates from 1,674 children of Jackson, Miss. May I call your attention to the fact that 278 children out of 315 received treatment by dentists as private pay patients. It cost the dentists of the community nothing. In fact, they were beneficiaries of the activity.

In Chambersburg, Pa., last year, among 2,000 school children there were 650 perfect teeth certificates signed by local dentists, and this year indications are that the number will go well over 1,000, owing almost entirely to the activities of the hygienist employed by the school board. In Allentown, where four dental hygienists have been employed for the past three years by the school board, I have it on authority of school officials that retardation has been reduced from 18 to 25 per cent. We do not say that this reduction is due entirely to the work of the dental hygienist, but it is significant that no other changes were made in the curriculum during that time.

There are about seventy-five school districts in Pennsylvania employing dental hygienists, and, without exception, the superintendents of these districts enthusiastically endorse the work. U. L. Gordy, superintendent of the Chambersburg schools, says, "Of all non-curricular activities in our schools, dental hygiene would be the last to go in any policy of retrenchment." Joseph F. Noonan, superintendent of schools of Mahanoy Township, in closing a recent letter to me, says, "Believing that the introduction of dental hygiene here will be productive of splendid results in connection with the general health of our school children, and extending heartiest good wishes, I remain, very truly yours."

The foregoing statements are endorsed by all school men in our state who have had any opportunity to observe the dental hygienist in school work.

Constant contact with members of the profession in many parts of the country is my authority for the statement that the majority of dentists dislike to work for children, and under past conditions the aversion to this work was natural, for a number of reasons. The child has rarely, if ever, looked forward to his first experience in a dental office with pleasure. Except among those of you who are confining your work exclusively to children, it is the usual experience to have the child brought to you actually suffering pain and also under great apprehension. Another reason is that it takes more nervous energy on the part of a dentist to operate on a child in this state of mind, and in most communities the child is taken to the dentist after school hours, which means that the operator is called on to do work that demands the best he has in him, at the ragged end of his busy day. Again, there is the profession's apathy toward children's work, and the old impression that compensation for this work should be at half fare as on railroad trains. If a child enters the dental office of its own volition seeking service on the advice of the school dental hygienist or for any similar reason, it gives the operator an opportunity to practice real preventive dentistry, and here might be added a long discourse on the subject. By this early and preventive service, the child is impressed with the value of frequent examination by his dentist, which means that, through regular periodic examination, the necessity for dental correction is reduced to a minimum. I find that the regular examination procedure is being adopted in a great many offices, which is, of course, a step in the right direction.

Now as to methods, which local dentists can ethically apply at home. Coudersport, Pa., has a population of 2,900 and a school population of 800. Two dentists are practicing there. The town is too small to make it practical to employ a dental hygienist and it is isolated so that it is not possible to employ such a worker in cooperation with some other community, as is frequently done; so these two dentists voluntarily suggested to the school board that they give prophylactic care to the school children of the district in their offices without compensation. This offer was accepted, and the plan is in operation. The dentists set aside one morning each week during which the school authorities, assisted by a community nurse, send fifteen or twenty children to each office for prophylactic treatment. In addition to this service, these dentists have taken it on themselves to give classroom talks in all the rooms of the borough. The principal of this school, who was in my office at the time this article was being prepared, reported that already there was a marked improvement in appearance and attitude of the entire school enrolment. This, to my mind, is an ideal plan by which members of the profession located in small communities can accomplish a bit of real service. In larger places, their activity should be directed toward stimulating local authorities toward the establishment of paid service of like nature using the dental hygienist or dentists, depending on personal opinion and local conditions.

We are not exploiting the services of the dental hygienist as a panacea for all dental ills. We know of a number of dental service plans in operation in various parts of the country that are accomplishing admirable results without the dental hygienist. Notably, there is one in operation in the rural schools of Virginia. Another fine program is being carried out in the schools of North Dakota by the training of all school teachers in the principles of dental hygiene, they, in turn, passing it on to their pupils.

The dentist in private practice can

wield a great influence in molding public opinion as regards public dental service. Examples of the results of this influence are: The Rochester Dental Infirmary, The Forsyth Dental Infirmary and many other similar activities where the philanthropically inclined wealthy citizens willingly supplied sufficient funds to work of this kind, as a result of their contact with some member of the profession. The obligation of all local dentists, then, is to seek a local Eastman or Forsyth, and win him to the idea of community dentistry.

In Pennsylvania, we have a volunteer organization made up of ethical practitioners of the state, which has been described. This plan is functioning beyond the expectations of its originators, and, by means of this group, it is planned to hold a state-wide dental health week, beginning February 22, 1925. The success of dental health weeks in Milwaukee and Detroit in previous years, and also in Reading and York, Pa., last year, has been our incentive to try to put over such a plan in every city, borough and hamlet in the state. We believe that the time has passed when it should be considered unethical for members of the profession to broadcast the importance of mouth hygiene, and we believe that every dentist in the community, both in groups and individually, should do everything in his power to disseminate proper information to the public.

In Pennsylvania this year, there are more than 100 dental hygienists serving, in seventy-five communities, and about as many more dentists engaged in school clinic work. There are, in round numbers, 1,800,000 children of school age in Pennsylvania, and it is estimated that approximately 300,000 of these children are receiving preventive and corrective service at the hands of these workers. The adopted slogan of the state dental society and the state department of health is "A clean mouth for every inhabitant of the commonwealth." Actually, this slogan will never be realized, but, within a very few years, it will not be the fault of the health department authorities or the dental profession if there is an unclean mouth in the state, for the message will have reached the remotest corner.

## THE DENTAL HYGIENIST

By ANNA V. HUGHES,* D.M.D., New York City

STRANGE as it may seem, there are many people, including dentists, who do not understand the special field of the dental hygienist. Many of them think she is a highly trained office assistant, while, in reality, she is primarily an educator.

Conservative statistics show that 95 per cent of the adult population have carious teeth. Such teeth are not only potential sources of pain and discomfort, but are also sources of disease, and with every mouthful of food they send into the system a supply of dangerous bacteria. Decayed teeth, moreover, are not able to do the work of biting, chewing, thoroughly masticating and preparing the food for the intestinal tract, and thus they are instrumental in bringing about the digestive troubles with which so many people are afflicted.

*Professor of Preventive Dentistry, Columbia University.

The harm has already been done to the adult; he is in the hands of the dentists, and it is his good luck that dental art is improving so rapidly. The dental profession has made great advances in knowledge and skill during the last few years. Still, they cannot control the situation and correct the bad habits already established among both adults and children. Nothing can absolutely replace the original sound tooth. Fillings and the other artificial means of restoring decayed teeth to usefulness are admirable, but at best they are makeshifts. A profession has been created to take care of the necessary educational work and to furnish the prophylactic service that helps to prevent tooth decay.

Here the dental hygienist enters the field of active service, and oral hygiene is rapidly gaining in favor as a field of professional work peculiarly adapted to women. The only hope of relief from the present situation is to take care of the rising generation, and it is for this service that the profession of oral hygiene has been created, a profession of educators and teachers of mouth hygiene and diet. Their aim is prevention. They begin by teaching the expectant mother how to provide sound teeth for her child as a consequence of her own intelligent dieting.

The really important work is with mothers and babies, preschool children and school children. The first five grades are the most important since there the dental hygienist can keep in good condition the deciduous teeth until their period of usefulness is over and the permanent teeth take their place. Big industries are taking advantage of this new opportunity for increasing efficiency among employes. Department stores, telephone companies, the Army, the Navy, banks and large social organizations are including dental hygienists among their personnel. Within the past eight years, oral hygiene work has developed rapidly.

Typical of the professional training required is the course at Columbia University, where a full academic year in the school of oral hygiene equips the dental hygienist for effective work. The professional curriculum is approved by the regents of the State of New York, and students cannot be matriculated until they file with the university evidence of four years of high school work or its equivalent. This precaution insures the necessary educational basis for the advanced technical studies that accompany the training in manual dexterity and skill in the handling of instruments. During the winter semester, the dental hygienist is instructed in the following theoretical subjects, calculated to give her an intelligent grasp on the importance of her calling and its relation to the work of the dentist: anatomy and physiology, dental anatomy, dental histology, oral hygiene, child and school hygiene, elementary chemistry, dentophysics, oral surgery (assisting), bacteriology and sterilization, pedagogy. And in the latter half of the college year, or second semester, she has courses in nutrition and dietetics, anatomy and physiology, comparative dental anatomy, dentochemistry, oral pathology, oral prophylaxis and pharmacology. Additional special lectures include roentgenology, occlusion and malocclusion, current dental literature, nursing ethics, clinical recording, public service and lay education. Armed with this preparation, and with the technic of oral prophylaxis, the dental hygienist is prepared to render valuable service.

The expectant mother needs the dental hygienist; for it is in the prenatal period that the greatest good can be accomplished for the baby's teeth and for the

mother's in the prevention of premature decay. At this period, mothers must have lime-producing foods. The kind of food a child receives after its birth is not so important as the kind it receives from the maternal food supply before birth, and it is hoped that a few years of emphatic dietary education will make mothers understand that children do not "inherit" soft teeth from their parents, but that poorly developed teeth may be traced to improper diet during the prenatal period and infancy.

For this reason, not only is the dental hygienist's mission fulfilled through friendly counsel while the patient is in the dentist's chair, having the teeth cleaned, but also through lectures, lantern slides, motion pictures, toothbrush drills, poster exhibits, and dental literature is the message broadcast. The habits of the child, such as thumb sucking, use of pacifiers, mouth breathing, etc., which cause malocclusion; the care of the child's deciduous teeth, and the importance of the first permanent molar are a few of the many things mentioned in her talks.

Not so many years ago, we accepted a great many things as necessary evils that we now know to be preventable. The deciduous teeth, for instance, used to be regarded as of no consequence. They were allowed to decay and the child's mouth was allowed to continue in a far from healthy condition. The result was that the soft bones of the child's mouth were malformed, and when the permanent teeth came, there was not room for them, and they were pushed out of line and rendered almost useless for biting and chewing. This condition can be avoided by caring for the deciduous teeth as conscientiously as the permanent teeth must be cared for later.

The dental hygienist calls attention to the value of the coarse foods, which strengthen the jaws and exercise both gums and teeth, shaping them to do their work effectively while they are still soft. She tells mothers and children that the foods that contain their natural minerals are best because they are prepared by Nature for easy assimilation. Among the lime-bearing foods that children need is milk, and they are taught to use a sufficiency of this growth-promoting food. These are some of the points on which the dental hygienist is trained to educate the people. If these points are neglected, the child's health is impaired before it has a start.

If the child is in a school where dental hygienists attend regularly to the cleaning of the teeth, he is sent to the dental clinic or to his own dentist at the first suspicion of decay, and thus the first permanent molar and many of the deciduous teeth are saved. Give us the children of the first five grades in all the schools! That is the plea of the experts, who realize the importance of oral hygiene. In this first five years of public school life, the dental hygienists can establish in the children habits of mouth hygiene and also give the regular prophylactic treatment necessary to keep the first teeth from decaying.

Eternal vigilance is necessary to keep down the bacterial plaque, so-called, without which no tooth can decay. This plaque is a thin glue-like accumulation or deposit which is soft, slimy, and very adhesive. The dental hygienist is trained to polish it away, for it is almost impossible to remove it with a toothbrush. What has been done for the children of the Bridgeport public schools can be done elsewhere. More and more schools are being founded, and more dental hygienists are being trained each year, but so far, the demand for their services far exceeds the supply of graduates ready to carry on the work.

# DENTISTRY IN PORTO RICO

By JOSE HERNANDEZ, D.D.S., San Juan, Porto Rico

IF YOU ever take a trip south of Florida, visit the beautiful tropical island of Porto Rico, "rich port," discovered by Columbus, settled by the Spaniards, and since 1898 under American influence. Comfortable boats will take you into San Juan harbor.

A Porto Rico Clinic

San Juan, the capital and chief port of the island, is the largest town and the center of industry, with a quota of forty-five dentists who care for a population of about 100,000 inhabitants. They are all general practitioners, although a few have specialized and devote some of their time to their specialty. Three dentists own and operate roentgen-ray machines and two are on hospital staffs. There are seven school dentists, and three practitioners are active in private institutional dispensaries. Besides these dental centers the city municipality owns and operates three first-aid dental offices. The school department provides dental treatment for indigent children in clinics located in different schools, the work being in charge of half-time dentists and full-time women assistants.

In all other principal towns of the island, you will find a modern sanitary school clinic in operation, some of them supported by the American Red Cross. Because the practical results obtained in the school clinics have proved so valuable, we have come to believe that they constitute one of the main sources of enlightenment of the laymen as to the benefits of dentistry.

San Juan, the home of the Porto Rico Dental Association and of the dental state board, has two dental depots. We have members all over the island. Monthly meetings are held with regularity and there is an annual convention, in June or July, which lasts for two days, with a scientific program, elections and banquet.

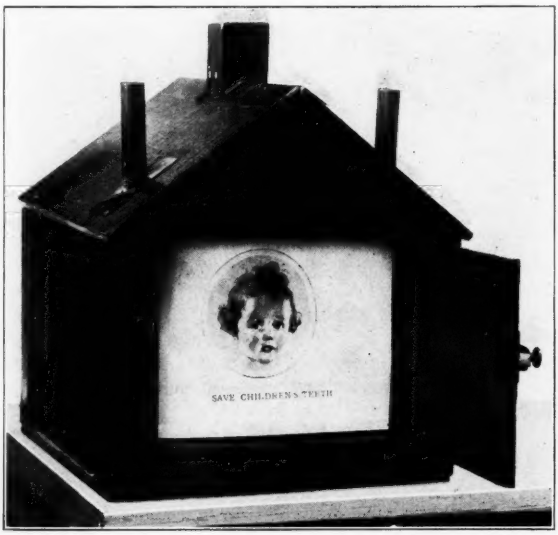
The dental state board requirements for a license are on a par with the most exacting state board examinations in the United States, and the dental laws are being so shaped that we may be able to ask reciprocity.

Radiating from San Juan are fine roads leading to Ponce, Mayaguez, Arecibo and numerous other towns, where there will be found groups of dentists practicing with American tools and materials and American technic. The city of Ponce ranks second to San Juan, in the number of dentists, with nineteen, there being about 110 practitioners besides those of the capital. Our professional men are graduates of the best American universities. Yearly additions to the number in practice average about ten graduates.

Porto Ricans are American citizens, and although our island is not joined to the States, it is our hope and dream that some day the American Dental Association will hold their annual session in San Juan, on this island of enchantment, with its picturesque old walls and forts, where a Spanish-English speaking population thrives, living in a complex of inherent racial dogmas and new American ways.

## SCHOOL HOUSE MOVIES

From Massachusetts comes the school house movies. This educational device may be used effectively in the lower grades of school or even in the waiting room of the dental clinic or private office, to teach children the fundamentals of dental health. Pictures cut from magazines are pasted at regular intervals on a long strip of paper, and below a pithy message is inscribed. The strip of pictures is tacked on both rollers, which are then inserted into the house. Any boy in a manual training class could make the house and any number of rolls of pictures might be prepared by the children as a part of their art work. The idea is inexpensive, practical and effective.




"School House Movies"

## "CARING FOR TEETH" EXHIBIT

Certain groups are not cognizant even of the simplest points in mouth hygiene. Simply to arrest their attention and to aid in drawing questions from them, rather than to attempt to tell the whole story, this exhibit was produced. It has none of the repellent qualities that an exhibit with pathologic specimens presents and, consequently, the spectator reacts more favorably, and is more receptive to the constructive ideas that it embodies. With this exhibit, as with all exhibits, material should be available for interested individuals to carry home and assimilate at leisure. For instance, one might have flyers on "Directions for Home Care of the Mouth," "Lime Water as a Mouth Wash," "Salt and Water for Brushing and Rinsing," etc.

"Caring for Teeth" Exhibit

## CAN YOU USE THESE LIBRARIES?

In order that the library of Northwestern University Dental School may serve the largest possible number, the services of an abstractor have been made available to the entire dental profession. Indexes now being published by the Dental Index Bureau are available for this work. Dentists who are writing papers or who wish to study the literature of a particular subject can secure selected lists of articles at nominal rates,

which will be supplied on application. Study clubs and members of the American Dental Association will be supplied with lists of articles on any subject, and, under certain conditions, books and journals will be sent from the Library at the cost of postage.

This work is in charge of Dr. William Bebb, to whom all communications should be addressed, in care of the Northwestern University Dental School, 31 West Lake St., Chicago.

The Elizabeth McCormick Memorial Fund, of 848 North Dearborn Street, Chicago, announces that its library is at the disposal of all health and social service workers and others interested in child welfare. The library, which is entirely devoted to child welfare subjects, the first of its kind to be established in this country, is unique in many respects. It contains several thousand volumes on nutrition, health education, school hygiene, mental hygiene, child labor and child psychology and all the standard periodicals. The trained librarian's assistance may be secured in connection with the gathering of material for special study or research.

A package service is maintained, certain of the publications being available as loans for a stated time. The only expense in this connection is the cost of transportation both ways. The Elizabeth McCormick Memorial Fund will be glad to receive visits and communications from those wishing to avail themselves of this library service.

## NATIONAL BABY CONGRESS AND HEALTH EXPOSITION

A national baby congress and health exposition, sponsored and supervised by the Illinois State Medical Society, was held in the American Exposition Palace, Chicago, Ill., May 2-9, in an endeavor to encourage regular health examinations and to educate the public to the advantage of checking up on the human machinery.

Nearly all of the public agencies for social philanthropy were represented with attractive booths, which displayed in a graphic manner that for which they stood. The Salvation Army showed a typical station; the Red Cross had a relief post; the Tuberculosis Sanitarium presented ideal sleeping quarters; the Public Health Department featured the many ways in which it acts as a safeguard; the Sanitary District furnished a miniature sewage disposal plant and a model water purifying system. There was an abundance of free literature on all subjects related to and bearing on health topics.

The examinations were arranged in three groups. The first group, designated "The Baby Group," included infants from 6 months of age to 2 years. The second group, called the youth section, included those between the ages of 6 and 18. The third division, known as the adult group, included all those over 18.

The examination of the first group consisted of:

I. Mental development. A check on the normal mental reactions.
II. Physical examination.
III. Oral and dental examination.
IV. Miscellaneous and review.
V. Weight and measurements.

There were in excess of 10,000 examinations in Group 1 alone. To be sure that these examinations were carefully made, the services of a great force of medical and dental men were enlisted.

We wish to report the splendid cooperation of the members of the Chicago Dental Society and the willingness with which they served in this worthy cause. Each of the eight days of the exposition, there were from twelve to fourteen busy dentists giving from three to five hours of their time. A total of more than 400 hours' work was their contribution to the cause.

The Public Service Committee
Chicago Dental Society.
F. BLAINE RHOBOTHAM,
Chairman of Committee for
National Baby Congress
and Health Exposition.

## ADDITIONS TO "THE BOOKSHELF"

Added to the Bookshelf are the following: "Health and Good Citizenship" and "Health and Success," by J. Mace Andrews, Ph.D., and W. A. Evans, M.D.; published by Ginn and Company. Both books have interesting chapters on the teeth and mouth.

## FIELD NOTES*

The Department of Household Science of the Illinois Farmer's Institute in its "Program Suggestions" has two programs devoted to "Care of the Teeth" and "Children's Teeth."

At the annual convention of the Illinois Federation of Women's Clubs, held at Decatur, May 19, a paper on oral hygiene was given by Dr. George West of Chicago. The message was thus received by many intelligent women who not only carry it into the home but also through their interest and knowledge, help to develop a dental health program in their community.

*The Department of Dental Health Education will be glad to receive items of news along the lines of education in dental or general health.

A health week was recently held in Illinois under the auspices of the Illinois State Medical Society. About fifty dentists in the state cooperated by speaking before various clubs. In order that there might be some uniformity to the message given, an outline was sent to every speaker.

Dr. Mary H. Westfall, chairman of the Oral Hygiene Committee of the Indianapolis Dental Society, reports that a recent dental survey was conducted in Marion County by the Indianapolis Dental Society with the cooperation of the county commissioners, superintendent of schools, parent-teacher association, Marion County Tuberculosis Association and other organized health and civic groups. The parent-teacher association is interested in establishing clinical service for indigent children throughout the county, which will be developed in the form of an itinerant clinic. During the survey two units, each consisting of two dentists, two senior dental students from the Indiana Dental College to mark the examination blanks, one dental assistant and one county health nurse, covered an itinerary previously arranged by the county nurses. The survey took ten days, during which time 6,988 children were examined and forty-three schools were visited. Forty different dentists, forty-three dental students and ten dental assistants conducted the survey, the entire expense of which was borne by the Indianapolis Dental Society. Of the 6,988 children examined, only 236 or about 3.3 per cent had no cavities, while practically all needed prophylactic treatment.

The Oral Hygiene Committee of the Indianapolis Dental Society is sponsoring a poster contest in the grade schools. Three prizes have been offered by the dental society to the schools presenting the best posters. The prizes are money to be used for purchasing works of art for the school buildings, the prizes not to go to individuals. The prizes are as follows: first prize, $35.00; second prize, $25.00; third prize $15.00. The prize-winning posters as well as those receiving honorable mention will be displayed at the annual meeting of the Indiana State Dental Society at Indianapolis, May 18-22.

The Massachusetts Dental Hygienists' Association held a four day exhibit, May 4-8, 1925, of chair, school, bedside and nutrition clinics at the Copley Plaza Hotel, Boston, with luncheon and meeting on Friday, May 8. Prof. Willis A. Sutton of Atlanta, Ga., spoke on Health Education in the Schools.

## WALWORTH MANUFACTURING COMPANY CLINIC

The dental clinic of the Walworth Manufacturing Company, Boston, Mass., has the following staff: Dr. Chas. A. Forbush, Dental Director, Dr. Chester B. Cutter and Miss Ruth Haughtaling, Dental Hygienist. An announcement was previously made that this clinic was discontinued.

## NEW DENTAL DISPENSARY

The Atkins Saw Works has recently established a dental dispensary for its employees. This is open five half days weekly. It is under the direction of Dr. B. A. Martin, Indianapolis, Ind.

## SCHOOL HEALTH WORK

Sanitation and bacteriology seem to be reaching the limit of their spheres of influence, for death rates have now ceased to fall with meteoric rapidity and the morbidity rate is still sky high. The commission appointed by Hoover to study industrial conditions reported that $1,800,000,000 annually was lost through preventable illness and death. Although the life span is now 56 years, the working span is only 40 years, and the health span 31 years. Degenerative diseases are on the increase. The maternal mortality is far higher than it might reasonably be expected to be. The deaths of infants during the first week of life have not decreased. Moreover, the idea is dawning that merely to keep people alive is not enough, that sickness causes misery and poverty, and that abundant vitality not only makes life more worth living but makes its possessor of greater value to the world. Which is better, to be able to carry on and carry on and still carry on, or to get up in the morning saying, "No ache today, I feel pretty well"? Personal hygiene seems to be the thing which holds out the most hope of achieving this desirable state of well-being. In other words, the time has come when people must actively participate in maintaining their health instead of passively acquiescing in having healthful conditions provided for them. So that public health is now entering upon a third period, the period of personal hygiene with education as the keynote. Positive health then is the next goal.—Frederika Moore, in Boston M. & S. J., April 30, 1925.

**The Journal of the American Dental Association**

58 East Washington Street, Chicago, Illinois.

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## *Editorial*

### VACATION TIME

Among the institutions of our modern civilization, a vacation has grown to proportions of immense importance. It was not so in earlier times when the stress and strain of things had not yet descended on us with all of their nerve-racking exactions—when life flowed along in a more or less happy-go-lucky fashion and tomorrow seemed a very convenient day in which things could be done. But in this age when we are traveling in high gear all the while, and when speed and ever more speed is the watchword of the hour—when to let down and slacken gait in the procession is to get run over—when the struggle not only for existence but for preferment has become the dominant idea in our lives—when we are not in any real sense masters of our own destiny—it is in this age that the necessity has arisen for an occasional let-up in our activities, and a complete change for a few weeks or a few months of every year. To "carry on" indefinitely at the pace most of us travel would be inevitably to break sooner or later.

It is always a mooted question whether we are living sanely or logically, or whether the pressure under which we are traveling is not a species of foolish aberration on our part. This is not for discussion here; it merely remains to note that it is the established pace of the day, and no one man or set of men can change it. We are, willy-nilly, driven at this breakneck speed, and we must look, after all, not so much to ourselves as to the agencies that set the pace. And what are these agencies? Not merely the leadership of a single man or of many men—not so much the influence of the personality of men, but the cumulative urge that the rapid succession of many significant inventions of the hour has forced on us. We are caught in the net of ingenuity that seems peculiar to the present age, and we must not extricate ourselves if we would hope to remain a cog in the modern machinery of life. It is not our fault, it is our fortune—a good fortune in its way—that we are made part and parcel of the great economic and social scheme of twentieth century progress, and while this progress takes greater toll of our physical and mental resources than would sometimes seem to us salutary,

on the whole we should be thankful for the privilege of living in this wondrous age.

With all the intense activity of the day, it is gratifying to know that the average tenure of human life is lengthening. This is due not only to better sanitation in our modes of living, but also, in large measure, among business and professional men, to the growing practice of taking regular vacations. It matters not what kind of vacation it is, so long as it is an entire change from the daily routine, and is of enthralling interest to the particular individual.

With dentists, who are necessarily more or less continually confined in the narrow limits of an office, the most suitable vacation is one which beckons to the great out-of-doors. The rocks and rivers, the fields and farms, the great heaving tide of the ocean, or the towering peaks of mountain tops, all make their peculiar appeal. To lay one's weary head on the beneficent bosom of mother nature, and breathe in the balm of balsam, spruce or pine is better than reclining in the gilded palaces of kings; to listen to the sunrise songs of birds and the twilight tones of the tender whippoorwill; to hear the lazy lapping of the wavelets on a pebbly beach, or the sighing winds among the needles of the pines—all of this brings solace to the heart and soul of man, and tunes him to the rhythm of the wondrous world around him. To sit beside a swirling brook, or watch the gleaming rapids leap from rock to rock and shout in madcap glee; to lie under the lea of a mossy bank and see the lights and shadows play across the surface of the quiet pond, and the tender lilies nod and smile in the receding sun—this is better than being in the hives of men, or struggling in the marts of trade; this is better than listening to the plaudits of the crowd or the acclaim of the populace.

From a vacation out in the open, the professional man returns refreshed in mind and body. He has been given new courage to approach the problems of the day, and he solves those problems more efficiently and with greater zest. Work is no longer drudgery—it is a privilege, and life is once more worth the living. Take a vacation—take it not only as an indulgence of the desires, but as a duty which you owe to yourself, to your family and to your patients.

C. N. JOHNSON.

## CHANGE OF ADDRESS OF A. D. A. OFFICES

The offices of the American Dental Association were moved about May 1 from 5 North Wabash Avenue to 58 East Washington Street, Chicago, Ill.

# Medical and Dental News

## CALIFORNIA

**San Francisco District Dental Society Meeting:** The preventive dentistry section of the San Francisco District Society met, March 30, in the Medical Building. Dr. Russell W. Bunting, of Ann Arbor, Mich., addressed the society on "The Underlying Causes of Periodontal Diseases and the Means of Their Prevention." In the evening, a dinner was tendered Dr. Bunting at the Union League Club. The following evening, March 31, an address "Diatetic and Bacteriological Factors in Dental Caries and Their Relation to Its Prevention," was given by Dr. Bunting before the Alameda District Dental Society, Oakland, Calif.

**Professional Buildings a Success:** It is said that medical and dental buildings have proved successful both from a utilitarian standpoint and financially throughout the country, according to records of the thirty-three buildings now in operation. Los Angeles has just completed a second medical building, the first being unable to take care of the demands for space.

## CONNECTICUT

**State Advisory Executives:** The State Advisory Committee Executives of the Seventh International Dental Congress for Connecticut is as follows: president, E. S. Gaylord, New Haven; first vice president, E. R. Bryant, New Haven; second vice president, G. S. B. Leonard, Mystic; secretary-treasurer, S. E. Armstrong, New Haven.

## DELAWARE

**Oral Hygiene Bill Passed in Delaware:** At a recent meeting of the state legislature of Delaware, an oral hygiene law was passed, similar to the oral hygiene laws already passed by twenty-seven states.

## INDIANA

**Health Lectures Before Rural Clubs:** Beginning March 31, physicians, dentists and health experts instituted a series of lectures on health before members of the women's rural clubs of Allen County.

## IOWA

**State University Medical Library:** At the request of the medical faculty, University of Iowa, the collections of books covering the medical sciences have been consolidated into a single medical library and housed in what was formerly the old chemistry building. An extensive addition has been made to this collection in the library of the late Dr. Pick, psychiatrist of Prague. This collection numbering more than 6,000 volumes, pertaining to neurology, psychology and psychiatry, has been purchased en bloc. A new medical laboratories building is being constructed, which will provide space for a library of 75,000 volumes and have a seating capacity in the reading room of 100. Special cubicles are being built in the stacks to accommodate persons doing extensive research in the library. The library at present contains about 6,800 bound journals and 4,500 books.—J.A.M.A., March 7, 1925.

## KANSAS

**Kansas Advisory Executives of 7th International Congress:** The officers of the State Advisory Committee of the Seventh International Dental Congress for Kansas are as follows: president, George A. Crise, Manhattan; first vice president, C. A. Martin, Winfield; second vice president, J. F. Kernan, Wichita; secretary, C. K. Weaver, Clay Center; treasurer, H. M. McFarland, Kansas City.

## LOUISIANA

**Advisory Executives of 7th International Congress:** The officers of the Advisory Committee of the Seventh International Dental Congress for Lousiana are: president, H. J. Siess, Mansura; first vice president, F. J. Wolfe, New Orleans; second vice president, L. J. Schoeny, Donaldsonville; secretary, J. P. Corley, Alexandria; O. J. Ory, Garyville.

**Sixth District Dental Society of Louisiana:** The sixth District Dental Society of Louisiana, which meets three times yearly, met in Baton Rouge, April 25, for a program of clinics and papers, the principal speaker of the day being Dr. Rufus Jackson (M.D.), who spoke on "Alveolar Infections of the Maxillary Antrum."

**Dentist on Health Board:** Dr. Fred Ratzburg of Shreveport, La., was recently appointed a member of the state board of health. Under the new organization of the state board of health, there must be one member from each congressional district, and in that number must be one dentist, one educator and one pharmacist.

## MARYLAND

**Officers of State Dental Association:** The newly elected officers of the Maryland State Dental Association are: president, J. Stepenson Hopkins, Belair; president elect, Alexander H. Paterson, Baltimore; vice president, W. A. Smith, Denton; treasurer, Walter E. Green, Baltimore; secretary, Norval H. McDonald, Baltimore.

**Maryland Advisory Executives of 7th International Congress:** The Advisory Committee of the Seventh International Dental Congress for Maryland has chosen the following officers: president, J. S. Hopkins, Belair; first vice president, H. H. Streett, Baltimore; second vice president, A. H. Paterson, Baltimore; secretary, N. H. McDonald, Baltimore; treasurer, H. A. Wilson, Baltimore. Dr. Alexander H. Paterson, Baltimore, as president-elect of the state dental association, is also a member of the advisory committee.

## MICHIGAN

**Michigan Advisory Executives of 7th International Congress:** The following have been chosen as officers of the Michigan Advisory Committee of the Seventh International Dental Congress: president, M. L. Ward, Ann Arbor; first vice president, O. W. White, Detroit; second vice president, E. A. Honey, Kalamazoo; secretary, C. J. Lyons; treasurer, F. W. Howlett, Jackson.

**Joint Meeting of Dentists and Physicians at Owosso:** Dentists of Owosso and vicinity were guests of the Memorial hospital staff and the Shiawassee County Medical Society, April 7. About thirty members of the two professions attended. Dr. B. S. Sutherland spoke on "Some Medico-Dental Problems."

**Michigan State Dental Society Election:** At a meeting, April 15, the following officers of the Michigan State Dental Society were elected: president, William A. Cook, Detroit; president-elect, James D. Locke, Grand Rapids; vice president, W. E. Brown, Benton Harbor.

## NEW JERSEY

**Testimonial Dinner to Dr. Hané:** A testimonial dinner in honor of Dr. C. F. Hané of Jersey City was given by the Hudson County Dental Society, March 14, 1925, at the Masonic Club, in appreciation of services rendered the society and the state board. Twelve years ago, Dr. Hané organized and incorporated the Hudson County Society, with twelve charter members. He was the first president of the society, which, owing largely to his interest and untiring efforts, now numbers 220 active members. Dr. Hané was presented with a gold watch and several floral tributes.

**New Jersey Advisory Executives of the International Congress:** The following officers have been chosen for the New Jersey Advisory Committee of the Seventh International Dental Congress: president, William H. Gelston, Camden; first vice president, John C. Forsyth, Trenton; second vice president, George H. Grim, Jersey City; secretary, F. K. Heazelton, Trenton; treasurer, A. E. Bioce, Trenton.

## NEW YORK

**School Medical Inspection in New York State:** Oral Hygiene: Parents, teachers and pupils are taking an increasing interest in mouth hygiene. Physicians and dentists are more and more appreciating the relation of a good dental equipment to good health, and the influence of well balanced nutrition and normal systemic functions over a good dental condition. School dental clinics are conducted in thirty-six cities, in twenty-four villages and in two rural communities. Dental hygienists, who occupy a relation to the dentist similar to that of the nurse to the doctor, are now employed in twenty-five cities, in seven large villages and in two rural sections. There are 100 places in the state in which oral hygiene work is carried on in the schools. Much volunteer service of which no record is kept is also rendered by dentists. During the past year, the state dental society conducted demonstrations in twenty places in order to show the practical educational value of the hygienists in oral hygiene work.—William Howe, in Am. J. Pub. Health, April, 1925.

**Ninth District Dental Society Officers:** At the annual meeting of the Ninth Dis-

trict Dental Society of New York, April 11, 1925, the following officers were chosen for 1925-1926: president, H. C. McBrair, Middletown; president elect, R. L. Clark, Mount Vernon; secretary-treasurer, F. A. Squires, White Plains; librarian, W. M. Fancher, Ossining; board of governors, H. S. DeWitt, Middletown, Otto Ernst, Larchmont, C. T. Lansing, Yonkers; editor, K. H. Metz, White Plains.

**School Medical Inspection in New York State:** The school medical inspection law, which was passed in 1913, transferred all health activities in the schools to the department of education, with the exception of those of New York City, Buffalo and Rochester, in which the health department had organized the work and so opposed the transfer. The law provides: 1. That a school medical inspector shall be appointed for all public schools in the state. 2. That every pupil shall furnish a health certificate within 30 days after school begins in the fall, or be examined by the medical inspector. 3. That children found with symptoms of communicable disease shall be excluded from school and the health officer notified of such exclusion. 4. That the commissioner of education shall enforce the provisions of the medical inspection law. 5. That the commissioner of education shall appoint a state medical inspector of schools to enforce the law under the supervision of the commissioner of education. In 1924, the law was amended in the following manner, without a dissenting vote: 1. To grant $1,000 state aid to districts the employ full-time school medical inspectors, and $700 to districts that employ full-time dentists, dental hygienists, nurses, health teachers, nutrition or other experts, approved by the commissioner of education. 2. Authorizing the board of supervisors of a county, with the approval of the commissioner of education, to establish school hygiene districts. When so established, a committee is created which is authorized to employ a full-time school health director. This committee consists of the city, village and district superintendents of the district, the chairman of the board of supervisors and the sanitary supervisor. The county pays one-half of the expense, the state the other half. 3. To establish the position of eye and ear expert and to appropriate $4,000 for his salary.—Am. J. Pub. Health, April, 1925.

**Advisory Executives of 7th International Congress:** The following officers of the New York Advisory Committee of the Seventh International Dental Congress have been chosen: president, Robert Murray, Buffalo; first vice president, F. T. Van Woert, New York; second vice president, A. M. Wright, Troy; treasurer, G. B. Beach, Syracuse.

## NORTH CAROLINA

**Carolina Dentists and Doctors Meet:** About eighty-five members of the dental and medical professions representing, respectively, the Charlotte Dental and Medical societies, met recently, in the Medical library of the professional building, Charlotte. Dr. Guy R. Harrison of Richmond, Va., gave an address on the "Borderline of Medicine and Dentistry." The medical publication Southern Medicine and Surgery has recently installed a dental department.

## OKLAHOMA

**Advisory Executives of 7th International Congress:** The following officers of the Oklahoma Advisory Committee of the Seventh International Dental Congress have been chosen: president, John Temples, Tulsa; first vice president, A. E. Bonnell, Muskogee; second vice president, T. H. Williams, Chickasha; secretary-treasurer, A. B. Walker, Norman.

## PENNSYLVANIA

**Alumni Day At University:** Friday, June 12, will be observed as Alumni Day at the University of Pennsylvania. The morning will be given to a business meeting and the afternoon to a program of fifteen clinics. In the evening, a banquet will be given at the Hotel Adelphia. Saturday, June 13, will be given over to class reunions, and a program of field and track events, together with a theatrical program.

## VIRGINIA

**Advisory Executives of 7th International Congress:** The officers chosen for the Advisory Committee of the Seventh International Dental Congress for Virginia are: president, H. Wood Campbell, Suffolk; first vice president, M. B. Rudd, Richmond; second vice president, John P. Stiff, Fredericksburg; secretary-treasurer, W. N. Hodgkin, Warrenton.

## FOREIGN

**Tokyo Children Suffer from Various Maladies:** According to a report of the Health Section of the Tokyo Municipality, based on the examination of pupils at several schools, there is an increase in the number of the children suffering from minor ailments, such as skin diseases and

undernourishment. The increase in sickly children is said to be due largely to lack of proper housing facilities resulting from the earthquake of 1923.—Japan Letter, J.A.M.A., April 25, 1925.

**"Summer Time" to be Made Permanent:** Daylight saving time, after eight years' trial, has been made permanent in England by action of Parliament. To quote the London correspondent to the Journal of the American Medical Association: "Dr. Graham Little (the dermatologist) said that at the request of the medical members of his constituency and as a physician he supported the fullest application of the bill. The opposition came largely from agriculturalists, who were in the fortunate position of spending all their lives in the fresh air, and hardly realized how selfish their action was in endeavoring to deny some little opportunity to others. We were on the eve of great extensions of knowledge of the properties of sunlight. At the light departments of the London hospitals, the transformation could be seen of a wreck of humanity into a reasonably healthy person as the mere result of sitting for half an hour three times a week in front of a very feeble imitation of sunlight which came from a carbon arc lamp. The advantages of sunlight and fresh air would be immeasurably increased for large numbers of people by the bill. He wished another beneficent change might accrue in the way of wearing less clothes in sunlight."

**Unethical South African Dentists:** Twenty-six dentists in Durban, South Africa, recently inserted their names in the advertising columns of a newspaper in the form of a "medical directory." The Natal Medical Council asked for an explanation. The council informed "the first signatory" that it disapproved of such advertising and hoped that no further action of a like kind would occur. In forwarding to the secretary for public health the letter of explanation from "the erring dentists," the council commented thereon to the effect that since licensed dentists in Durban suffered because of the unqualified dental practice prevailing it was inclined to take a tolerant view of this action. This was, in the opinion of the South African Medical Record, a grave error of judgment on the council's part. It extenuated a distinctly unprofessional course of action, because certain dentists are competitors of other dentists who are bound by no ethical rules whatever. As much as to say, since quacks are numerous in Durban, there are no professional ethics east of the Umzimkulu.—J.A.M.A., May 2, 1925.

**Artificial Sunlight Treatment:** Electric power for making artificial sunshine so that it can be turned onto any cot in the main wards has been installed recently at the Infants' Hospital, Vincent Square, London. The mercury vapor bath which produces a warm light simulating sunshine in its action, is already a feature at this hospital. According to Dr. Eric Pritchard, the medical director, it has proved invaluable in cases of anemia, rickets and other wasting conditions which natural sunshine would help to cure. The first municipal clinic in London for the provision of treatment by artificial sunlight was opened on March 19 in a district of the borough of St. Pancras, one of the large London boroughs. Professor Leonard Hill, who spoke at the opening, said that the lamp which gave off the ultraviolet rays would not harm the baby. It had been discovered that, unlike cod liver oil, olive oil had not the power to prevent rickets, but that it could be endowed with that power by irradiating it with ultraviolet rays. Whether margarine could be similarly endowed was now the subject of investigation. In Hampstead, it was being seriously proposed by the mayor that some of the public baths should be used by the children who attended the council schools for dancing around lamps to gramophone music twice or three times weekly, and in that way obtaining the advantages of ultraviolet treatment.—London Letter, Boston M. & S. J., April 30, 1925.

**Dentistry in China:** In West China, there are about 100 million people with only the one dental college in Chengtu. It is like founding a school in Cincinnati for the whole of the United States and far worse than that because there are no transportation facilities of any sort in West China. The Union University of Chengtu, which was founded sixteen years ago, now has a campus of 140 acres outside the city wall, the grounds have good roads and trees and fine buildings, most of which have a European frame with the Chinese roof with their sky tilted corners. There are eight buildings including a high school and seven dormitories for students, all full, and about thirty residences for foreigners and a large school for white children. There are a few fine athletic fields. The high school is full to capacity, and there are 300 pupils, and 260 in the university.

Of these, twenty-two are dental students, who have a good average scholarship. In 1911, a dental hospital was built in the city, which was enlarged by adding a second story in 1920. A dormitory for the students and mechanics was built in 1921. There are four small and one large operating room, a large laboratory and an x-ray room; which, with other rooms, makes about fifteen in all. In 1923, the university dental clinic was started and is carried on in the administration building. The work and the teaching is divided among the various teachers. Many very difficult cases present themselves owing to delay in treatment. However, the dentists have to be their own specialists, which is a good thing for them. A fair fee is charged and a good surplus over the running expenses every year is paid to the university. The college course is six years. English is taught throughout and Chinese for most of the time. Most of the teaching is done through the medium of the Chinese language. Being a part of the university, the faculties of science and medicine assist in teaching the dental students. Without their aid, it would be difficult to carry on.—J. E. Thompson, in Dominion Dent. J., April, 1925.

**Masons Honor Dr. Butler:** Dr. W. O. Butler of Wilkie, Canada, was honored at a banquet on the occasion of his seventy-fifth birthday, recently. Dr. Butler is still actively engaged in practice, which he entered upon in 1873.

## GENERAL

**Dr. Thomson Chosen Dean:** Dr. G. K. Thomson was chosen dean of the dental faculty of Dalhousie university, recently, to succeed the late Dr. Ryan. Dr. Thomson is president of the Canadian Dental Association and a Fellow of the American College of Dentists. He graduated from the Philadelphia Dental College in 1892.

**Physicians to Study with Undergraduates:** The Columbia University School of Medicine announces that the clinical lectures of the third and fourth year hereafter will be open to the general medical profession.

**What is a Sanitary Drinking Fountain?** In order that the public may better understand what type of drinking fountain will not endanger public health, the final report of the committee on sanitary drinking fountains of the American Water Works Association is published. The types of fountains recommended are those having the angle jet, the protected orifice and sanitary guards.—Am. City, abstr. Am. J. Pub. Health, April, 1925.

**Cancer Research Journal:** The first issue of the Archives of Clinical Cancer Research, to be published quarterly by the New York City Cancer Institute of the Department of Public Welfare, appeared in April. The members of the editorial board are Drs. Charles H. Mayo, Willy Meyer, A. C. Cristie, Burton T. Simpson, Barnet Joseph and Isaac Levin. Contributions from pathologists, diagnosticians, surgeons and radiotherapists will be published.

**Glass Permeable to Ultraviolet Rays:** Lecturing at the Royal Institution on "The Biological Action of Light," Mr. Leonard Hill produced three types of glass which are permeable to the ultraviolet rays, now known to be so valuable in the prevention of disease. Since one of these is low priced, it may be possible for even the poorest hospital to use it. It is necessary to have this glass only in the upper parts of the window, but care has to be taken to keep it very clean, as the smoke-polluted air of our cities quickly clogs up the glass, which then cuts off the ultraviolet rays. This glass is being tested in a London hospital. Mr. Hill hopes that some windows in every ward of our hospitals, nurseries and schools will be so glazed that advantage may be taken of every ray of sunlight that can struggle through our fog and smoke laden atmosphere.—London Letter, J.A.M.A., April 25, 1925.

**New Anesthetic:** A new anesthetic, which ultimately may result in the abandonment of cocaine for this purpose, has been discovered by Dr. Schulemenn, German scientist, it was announced by the American Chemical Society. The new compound, known as tutokain, is said to have been discovered among the intermediate products in the manufacture of artificial rubber. Unlike cocaine, it is nonpoisonous in practical use, it is said, and can be sterilized without decomposition. "Cocaine," according to the society's report, "is so much in demand in Germany today that, because of its habit-forming properties, attempts are being made to discontinue its use and gradually forbid its manufacture and traffic."—Am. J. Pub. Health, April, 1925.

**Rules for Admitting Students to Johns Hopkins:** Following the proposal of the president of Johns Hopkins University to reserve that school primarily for advanced learning, changes have been made

in the method of admitting medical students. These entail the selection hereafter only of "Grade A" candidates by means of individual study of those who apply for admission. The immediate results expected will be a decrease in the number permitted to form a class, and a calmer, less apprehensive devotion to studies by first year students. Some time ago, classes at the school of medicine were limited to ninety and subsequently to seventy-five. Under the new rules, it is estimated that classes will number fifty-five or sixty, although seventy-five will be accepted if that number of "Grade A" students applies. The changes apply to freshmen of next year, who are being selected now. The new regulations prescribe that the prospective student of medicine must submit to the dean a photograph of himself, a statement of from 150 to 300 words in his handwriting about his activities in college, and the names of two teachers of premedical sciences under whom he studied. If the applicant lives within 200 miles of Baltimore, he must arrange an appointment with the assistant dean and present his application in person. If his home is more than 200 miles from Baltimore, he will be instructed to arrange an appointment with a designated regional representative of the admissions committee, who will send to the dean his opinion as to whether the applicant is the type that Johns Hopkins should admit.—J.A.M.A., March 7, 1925.

**Report of the American Relief Fund Committee:** The following report was submitted by the American Relief Fund Committee;

Rochester, N. Y., May 1, 1925.

Dr. Otto U. King, Sec'y & Editor,
American Dental Association.

My dear Dr. King:

The American Relief Fund Committee of the State of New York respectfully presents for your consideration the attached report.

Sincerely,
Edward G. Link, Chairman.

Committee:
Edward G. Link
R. Ottolengui

| | |
|---|---|
| Seventh District Dental Society | $100.00 |
| Eighth District Dental Society | 150.00 |
| Buffalo Dental Association | 50.00 |
| Rochester Dental Association | 100.00 |
| Dr. Edward L. Schlottman | 5.00 |
| Dr. Paul Jones | 5.00 |
| Dr. Edward G. Link | 5.00 |
| Dr. John T. McIntee | 2.00 |
| Dr. Marvin Welcher | 2.00 |
| Dr. Lewis S. Goble | 2.00 |
| Dr. George D. Greenwood | 2.00 |
| | 423.00 |

Dental Trade

| | |
|---|---|
| Norton-Starr Dental Co. | 10.00 |
| Heusner & Piehler Dental Co. | 5.00 |
| Ritter Dental Mfg. Co. | 15.00 |
| Primrose-Johnson Dental Co. | 20.00 |
| James S. Hulme Dental Laboratory | 2.00 |
| | 52.00 |
| | 423.00 |
| | 475.00 |
| Expenses | 8.35 |
| Total | $466.65 |

## DEATHS

**Carr, Ellen R.,** Collinsville, Conn.; Philadelphia Dental School, 1898; a dentist for forty years, practicing in Hartford before coming to Collinsville; died, April 21, 1925, of cerebral hemorrhage; aged 70.

**Christy, Joseph A.,** Pittsburgh, Pa.; University of Pittsburgh, 1912; died April 20, 1925.

**Christy, R. R.,** Tarentum, Pa.; University of Pittsburgh, 1901; died recently.

**Cohen, A. H.,** Little Rock, Ark.; Tulane University of Louisiana School of Dentistry, 1905; died April 15.

**Comins, Albert Owen,** Stafford Springs, Conn.; Philadelphia Dental School, 1891; died April 20, of acute indigestion; aged 58.

**Robertson, L. P.,** Marlin, Texas; Baltimore College of Dental Surgery, 1881; for forty years a practicing dentist, died, March 21, of acute dilation of the heart, aged 64. Dr. Robertson was a former president of the Texas Dental Association.

**Smith, Eugene H.,** Boston, Mass.; Harvard University Dental School, 1874; dean and professor of clinical dentistry at Harvard; died recently from heart disease.

**Smith, Linford:** Linford Smith, founder and publisher of Oral Hygiene, and widely known throughout dental trade and the dental profession, died recently.

## ARMY

**Dental Corps:** Maj. Frederic H. Bockoven from duties at Fort Riley, Kan., and detailed at University of Minnesota, Minneapolis.—Army and Navy Register.

# CURRENT LITERATURE

## EXTRACTS AND ABSTRACTS

**Focal Infection in Recurrent Abortion:** Three cases of spontaneous recurrent abortion in which a recurrent mouth infection, a chronic sinus infection, and the presence of streptococci and other bacteria, respectively, were found are reported by Arthur H. Curtis (J.A.M.A., April 25, 1925). In the first case, there was no evidence of abnormality, but culture of the urine yielded hundreds of colonies of hemolytic streptococci. No oral foci were demonstrable, but the husband of the patient had an apical infection of several teeth. After this was treated, the oral infection disappeared, and by the usual treatment the kidney infection was overcome. The patient has since had three healthy children. In the third case, the patient had had eleven abortions. There were no symptoms of kidney disturbance, but culture yielded diplococci and streptococci. Oral hygiene was found to be greatly needed. The husband's teeth showed pockets of infection, and smears yielded pus and rich bacterial flora. Dental care was given both husband and wife, the latter receiving also treatment of the urinary tract. A twelfth pregnancy is now advanced beyond the latest date of termination of any of the previous pregnancies. Two more recent cases, in which two devitalized teeth and extensive periapical infection, respectively, were found, tend to confirm the evidence afforded by Cases 1 and 3. "Summary and Conclusion: Spontaneous abortion is relatively frequent in patients who are free from syphilis and have no gross abnormalities of the pelvic organs. Three barren patients with a pronounced history of habitual abortion all revealed active foci of infection with associated kidney involvement. Two have borne healthy children since being relieved of their infections; and the third, with a history of eleven abortions, is now well and is nearly six months pregnant. Intravenous injection of numerous pregnant rabbits with fresh cultures of hemolytic streptococci, obtained from these patients, has invariably resulted in prompt termination of pregnancy. Control experiments suggest that other virulent bacteria do not possess such a high degree of specificity. Focal infections with a tendency to fresh exacerbations appear to be an important cause of otherwise inexplicable spontaneous abortion in women. Repeated inoculation of susceptible patients with bacteria from the oral cavities of human carriers of infection may also be a factor. Low-grade chronic foci are probably a less serious menace to the growing fetus."

**Dentistry and Urology in Focal Infections:** I should think the dental profession might at times find itself in rather a quandary regarding the removal of infected teeth. Just what is the proper procedure to follow in border-line cases might prove quite puzzling. There should be no question, however, as to what course to pursue if the patient shows a renal involvement which might be attributed to or associated with the dental pathology. In such instances, the pyelitis or pyelonephritis is of such grave import that it overwhelms any minor conservative oral consideration. I feel in this respect that this fact should be borne in mind: it is possible to replace a natural tooth or teeth with an artificial substitute which will serve a fairly efficient end, but it is utterly impossible to reconstruct a badly damaged kidney to anywhere near the same degree of efficiency which is possessed in health. Since any pyogenic lesion within the kidney or its drainage system, however slight it may be, is potentially dangerous, it seems to me that when such lesion does exist it is excellent practice to remove infected teeth without delay in order that they might not be permitted to be the active and inciting influence to bring about a fulminating kidney storm.—T. V. Williamson (M.D.), in Dent. Cosmos, April, 1925.

**Treatment for Vomiting:** A simple immediate treatment for vomiting is reported by E. P. Lehman and H. V. Gibson (J.A.M.A., April 25, 1925). Effects of the oral administration of a 2 per cent solution of sodium chlorid in a surgical case complicated by upper gastro-intestinal peristalsis, in producing a prompt secretory and forward motor activity, which overcame reverse peristalsis, suggested that similar medication might be of advantage in reestablishing normal peristalsis when a tendency to reverse peristalsis was present. In view of the highly satisfactory results in applying this simple treatment in a number of selected cases, the authors express surprise that its efficacy has not been discovered earlier, especially since warm salt solution has long been a household remedy employed to induce vomiting. The dose varied from 50 to 200 c.c., and the solution was given cool. Relief was immediate, although in some cases only transient. The treatment is absolutely harmless except in cases in which the use of salt is contraindicated. Fifteen cases are reported, covering vomiting in shock following an accident, abdominal operations, emotional and physical strain, car sickness, nausea of pregnancy, duodenal ulcer, alcoholism, digitalization in heart disease, nausea following alcohol injection for trigeminal neuralgia, indigestion and nausea after exploratory laparotomy.

**Biology and the Orthodontist:** If Darwin had lived long enough, he might have written for the benefit of the orthodontist. If malocclusion was hereditary for generations and some applied force of Nature, like complete change of diet, of living, like primitive man, each succeeding generation showing improvement until the race developed normal occlusion, then the term natural selection would be properly applied.

It is plainly seen from these quotations, as well as many others which might be cited in Darwin's works, that natural selection does not pertain to the physiological and functional activity of one generation of any species. It is clearly evident, except in the ratio above stated, that natural selection acts only on many successive generations extending over long periods of time, and then only with slight variations. Any change by natural selection during orthodontic treatment would be like comparing a millimeter with the circumference of the earth.—W. J. Bell in Pacific Dent. Gaz., March, 1925.

**Use of Morphin Before and After Operations:** In order to obtain the opinions of some of the leading surgeons on this subject, M. A. Slocum (J.A.M.A., April 25, 1925) sent out 100 questionnaires. From the responses received, he reaches the following conclusions: 1. The surgical profession is distinctly not in accord regarding the use of morphin before and after operations. 2. The reasons given, by surgeons in general for not using morphin differ widely. 3. It is a curious fact that one group of prominent men condemns morphin as definitely producing unfavorable symptoms, while another group advocates its use because it prevents these very symptoms. 4. This questionnaire clearly establishes the fact that a majority of surgeons are in favor of morphin preoperatively and postoperatively in practically all cases. 5. At the present time, there is less fear of using morphin in surgery than there was twenty years ago. Whether this should be a danger signal or whether it has come about because of advances in knowledge remains to be proved. 6. An attempt should be made to set some sort of standard by which we can be guided in our use of morphin. While it is admitted that it is difficult to standardize the use of drugs in general, it is felt that morphin is of sufficient importance, and in general enough use in surgery, to merit at least a trial toward standardization. 7. There seems to exist a vast field for research, animal and otherwise, in the therapeutics of morphin. It is true that there is a great deal known about the pharmacology of morphin. However, there is little mention in the literature of work done on animals regarding the effects of morphin on the kidneys, circulation, gastro-intestinal tract and respiration.

**Some Feeding Problems of Childhood:** The longer a child has been on a one-sided diet, the stronger become his food prejudices and the more difficult it is to hold him to a balanced ration. It seems as though his tissues and organs become specialized, as it were, to certain kinds of foods, and always there is the old subconscious pull of habit that drags him back to his old ways of eating. That is why it is so difficult to feed the older child whose habits of diet have become fixed. That is why it is so extremely important to start the child on the right foods at an early age. To get this fact before parents is one of our duties in preventive medicine, for it is easier to prevent malnutrition than it is to cure

it. From what already has been done for the general welfare of the child there is good reason to hope that mothers in general will come to know more of the art of good cooking, and that both mothers and fathers will learn more of food values and the urgent importance of the early training of children to proper dietary habits. Here in this land of plenty, of sunshine and fresh air, of milk, luscious fruits and fresh vegetables, of fresh eggs and fresh meats, it seems a crime against Nature that any child should walk among us with the blight of malnutrition upon him.—C. Hilton Rice, Jr., in Scientific Monthly, April, 1925.

**Child Welfare in Japan:** The first child welfare work to be undertaken in Japan was that of the French government, which sent an army relief hospital to Tokyo after the earthquake. (K. Moteki and S. Masaki, in Nation's Health, April, 1925.) For three months, undernourished children from the slums, ranging in age from 7 to 15 years, and numbering 693, were cared for in the hospital. Groups of 150 to 200 were accommodated at one time, for periods of three weeks, during which a careful routine giving attention to sleep, rest periods, exercise, play, study, diet and care of the body, including the teeth, was followed. Surprising gains were made in weight, height and bodily activity. A comparison was made of the hospital wards with a group of school children of the better class, the latter showing higher figures in every case. The hospital wards showed a greater percentage of scrofulous lymphatic swellings and enlarged tonsils, but had 10 per cent less carious teeth than the school children, owing presumably to the fact that the upper classes eat more sweets. The successful results of this work have led the municipal authorities of Tokyo to establish a similar enterprise, the results of which have been equally gratifying.

**Health Significance of the Preschool Years:** The health significance of the preschool years can be quickly summed up. First of all, it is the period when death and disease pile up their biggest scores. One-third of all the deaths of the nation occur below the age of 6. There are ten times as many deaths during the half decade of preschool life as during the following full decade of school life. Even physical accidents like being scalded, burned, injured, and run over by automobiles, bear with special weight on the preschool age. The susceptibility to infection is generally greater the younger the child. Over 80 per cent of all cases of diphtheria, and of all deaths from diphtheria, occur before the age of 5. Malnutrition, likewise, is more prevalent among preschool and among school children. Rickets, a disorder of nutrition, is almost as common as dental caries and is essentially a preschool disease. Approximately, 15 per cent of the 3,000 preschool children clinically examined in Gary, Indiana, showed bony defects of rachitic origin. With few exceptions, the typical physical defects of school children, such as malnutrition and nose and throat troubles, are more prevalent among preschool children. Sir Arthur Newsholme, late principal medical officer in England, asserted that the chief value of medical inspection of school children has been to demonstrate the extent to which children of school age are suffering from defects and diseases which might have been prevented or minimized by attention to the preschool period.—Arnold Gesell, quoted in the Child Health Magazine, January, 1925.

**Dietary Factors Influencing Calcium Assimilation:** In a fifth study "The Effect of Light on Calcium and Phosphorus Equilibrium in Mature Lactating Animals," by Hart, Steenbock and Elvehjem (J. Biol. Chem., 62: 117, 1924, Abstr. Am. J. Dis. Child., Feb., 1925), the calcium and phosphate intake and output of two lactating goats and one dry goat, living in comparatively dark cages and receiving a diet deficient in vitamin A, are presented. "The tendency was for the animals to develop a negative calcium balance sooner than the nonlactating animal. When the animals received irradiation from a quartz mercury lamp, the calcium balances became positive. The phosphate balance was also rendered more positive. The paper brings out the fact that the value of light in preventing osteoporosis in adult animals is similar to the value of light in preventing rickets in growing animals."

**Action of UltraViolet Rays:** Ultraviolet rays have very little penetrating power; unlike the wireless waves on the one hand which pass through anything, and the x-rays on the other which penetrate the tissues deeply, the ultraviolet rays only penetrate a very slight thickness of the skin. From this we may deduce that any general results which may be obtained, or any changes which may

take place in the deeper tissues of the body are secondary. Ultraviolet radiation cannot penetrate ordinary glass but passes through quartz, thus differing from the visible rays of the spectrum which, of course, pass freely through clear glass. A body charged with negative electricity loses its charge under the influence of ultraviolet light, and taking into consideration the theory that the atom consists of a positively charged nucleus surrounded by a varying number of negatively charged electrons variously arranged, it may well be that the whole secret of the action of ultraviolet rays lies in this fact. Dr. Leonard Hill says, "Ultraviolet rays penetrate, are absorbed by, and warm the cutaneous blood vessels; they produce alteration of electrical charge, resulting in changes in the aggregation of colloidal contents of the living substance of the deep epidermic cells, and in consequence there follow erythema, increased exudation of lymph and white corpuscles. They put up the bactericidal power of the blood." Claim is made that after exposure to these rays, the blood, the kidneys, liver and muscles become richer in oxygen. Secretion of calcium and phosphates is diminished and the quantities contained in the blood increase, and also more iodine is found in the thyroid gland. There is some difference of opinion about the bactericidal properties of the ultraviolet rays, but it is certain that the shorter rays have definite bactericidal properties since mercury vapour lamps are used to sterilize suspected typhoid water; the action of the shorter rays, 4,000 to 3,000 A.U., is probably, as Dr. Leonard Hill says, "to put up the bactericidal properties of the blood." These properties of ultraviolet rays help us to understand why they are used with such success in rickets and similar diseases which result from an impoverished condition of the blood, especially those in which calcium and phosphates are deficient. May we not here perhaps have a means of combating that deficient bone growth which is making abnormal occlusion so general in children?—Brit. Dent. J., Feb. 16, 1925.

**Ultraviolet Ray in Pain:** Eight cases in which pain, of long standing, in the head and neck, was overcome by use of the ultraviolet ray are reported by W. A. Lurie (J. Radiol., April, 1925). The conditions included facial pain after removal of teeth, demanding frequent injection of morphin; neuralgic head pains after loss of the upper teeth, also calling for morphin in order to induce sleep; trifacial neuralgia; facial pain and swelling; facial neuralgic pain involving the ear and right brachial areas, unrelieved by extraction of four condemned teeth; and infection of the left eye from trauma, demanding heavy doses of narcotics. In no case was there recurrence of pain after the ultraviolet therapy.

**Ultraviolet Therapy:** Seven cases successfully treated by the ultraviolet ray, including three cases of pyorrhea, two cases of Vincent's infection, and one each of partially erupted third molar, causing severe pain, and periodontitis and another in which differential diagnosis between periodontitis and pulpitis was made possible are reported by D. L. Galbreath (Dent. Mag., March, 1925).

**Oral Sepsis:** I happen to know of a patient who, always healthy before, was thrown from a buggy without sustaining a fracture. He never was confined to bed, but was able to walk about, though with a slight limp on account of the "bruises" sustained at the time of the accident, as he claimed. Because the limping and pain in the hip continued, he consulted a doctor who diagnosed chronic arthritis and advised removal of the teeth, the hygiene of which had been sorely neglected. All were removed, but the condition did not improve. Two years later, a thorough local examination, measuring of the extremities, and taking of radiographs proved the presence of a consolidated impacted fissure, a crack, of the neck of the femur, with some permanent outward rotation and shortening of the extremity. A higher sole and heel on the affected side, with avoidance of over-exertion, soon brought great relief. But his teeth were gone.

In this high tide of wholesale teeth extraction dentists themselves soon called a halt. A great many bought their own X-ray apparatus, or at least, sent the patient first to an X-ray specialist. Careful study and interpretation of the films were considered a necessity. The result was increasing conservatism and the extraction of such teeth only as were beyond repair and clearly seemed a menace to the owner's health.—Willy Meyer, in Oral Topics, February, 1925.

# Announcements

## CALENDAR OF MEETINGS

### NATIONAL SOCIETIES

American Academy of Periodontology, Louisville, Kentucky, September 17-19, 1925.

American Dental Assistants' Association, September 21-25, 1925, Louisville, Kentucky.

American Dental Hygienists' Association, September 21-25, 1925, Louisville, Kentucky.

American Dental Association, September 21-25, 1925, Louisville, Kentucky.

American Dental Society of Europe, July 28-31, London.

American Society of Oral Surgeons and Exodontists, September 18-19, 1925, Louisville, Kentucky.

Belgian Congress of Stomatology, July 11-14, 1925, Brussels, Belgium.

Fédération Dentaire Internationale, August 2-6, 1925, Geneva, Switzerland.

National Association of Dental Examiners, at Louisville, Kentucky, September 21-22, 1925. President, G. L. Powers, Memphis, Tennessee.

Pacific Coast Dental Conference, 1926, Portland, Oregon.

Seventh International Dental Congress, August 23-28, 1926, Philadelphia, Pennsylvania.

### STATE SOCIETIES

District of Columbia, at George Washington University, Washington, D. C., second and fourth Tuesdays in each month from October to June inclusive.

National Capital at Washington, D. C., first Tuesday of every month.

June (1925)

Colorado, at Colorado Springs (18-20).
Georgia, at Augusta (10-12).
Maine, at Bangor (25-27).
New Hampshire, at Manchester (10-12).
New Mexico, at Albuquerque (22-24).
Oregon, at Portland (3-6).
South Carolina, at Columbia (17-19).
South Dakota, at Watertown (11-13).
Southern California, at Los Angeles (29-30, July 1-2).
Utah, at Salt Lake City.
Washington, at Spokane (1).
Wyoming, at Buffalo (29-30).

July (1925)

Montana, at Great Falls (29-31).
Porto Rico, at San Juan (5-6).
Rhode Island, at Newport.
Wisconsin, at Madison (14-16).

September (1925)

Kentucky, at Louisville (18-19).

October (1925)

Florida, at Orlando.
New England, at Boston, Mass. (15-17).

December (1925)

Nevada, at Reno (5).
Ohio, at Columbus (1-3).

February (1926)

Minnesota, at St. Paul (10-12).

## MEETINGS OF THE STATE BOARD OF DENTAL EXAMINERS

Alabama, at Tuscaloosa, commencing June 22, 1925, Secretary, E. W. Patton, Selma, Alabama.

Arkansas, at Little Rock, June 22-24, 1925. Secretary, W. E. Hutchinson, Dermott, Arkansas.

Connecticut, at Hartford, June 25-27, 1925. Recorder, Arthur B. Holmes, Waterbury, Connecticut.

Delaware, at Wilmington, June 17-18, 1925. Secretary, W. S. P. Combs, Middletown, Delaware.

District of Columbia, at Washington, June 15-19, 1925. Secretary, C. Willard Camalier, Washington, D. C.

Florida, at Jacksonville, June 24, 1925. Secretary, R. P. Taylor, 414 St. James Bldg., Jacksonville, Florida.

Indiana, at Indianapolis, June 8-13, 1925. Secretary, H. C. McKittrick, 502 I. O. O. F. Bldg., Indianapolis, Indiana.

Iowa, at Iowa City, June 1, 1925. Director, H. W. Grefe, Des Moines, Iowa.

Kansas, at Wichita, June 15, 1925. Secretary, George E. Burket, Kingman, Kansas.

Kentucky, at Louisville, June 2, 1925. Secretary, J. H. Baldwin, 908 Francis Bldg., Louisville, Kentucky.

Maine, at Augusta, June 29-July 1. Secretary, G. W. MacKay, Millinocket, Maine.

Maryland, at Baltimore, June 2-4, 1925. Secretary, T. L. McCarriar, 1822 North Charles Street, Baltimore, Maryland.

Massachusetts, at Boston, June 16-20, 1925. Secretary, J. N. Carriere, Room 146, State House, Boston, Massachusetts.

Michigan, at Ann Arbor, June 8-13, 1925. Secretary, J. W. Lyons, 617-19 Dwight Bldg., Jackson, Michigan.

Minnesota, at Minneapolis, June 22-July 2. Secretary, R. B. Wilson, 1133 Lowry Bldg., St. Paul, Minnesota.

Missouri, at St. Louis, June 10-13, 1925. Secretary, George E. Haigh, Jefferson City, Missouri.

Mississippi, at Jackson, June 16, 1925. Secretary, Reuel May, Jackson, Mississippi.

Montana, at Helena, July 13-17, 1925. Secretary, Marshall E. Gates, Helena, Montana.

New Jersey, at Trenton, June 29-July 3, 1925. Secretary, John C. Forsyth, 429 E. State St., Trenton, New Jersey.

North Carolina, at Raleigh, June 15, 1925. Secretary, F. L. Hunt, Asheville, North Carolina.

North Dakota, July 14, 1925. Secretary, W. E. Hocking, Devils Lake, North Dakota.

Oklahoma, at Oklahoma City, June 22, 1925. Secretary, L. M. Doss, American National Bank Building, Oklahoma City, Oklahoma.

Pennsylvania, at Philadelphia and Pittsburgh, June 17-20, 1925. Secretary, Alexander H. Reynolds, 4630 Chester Avenue, Philadelphia, Pennsylvania.

Rhode Island, at Providence, June 23-25, 1925. Secretary, Albert L. Midgley, 315 Butler Exchange, Providence, Rhode Island.

South Carolina, at Columbia, June 15-18, 1925. Secretary, W. K. Walker, Orangeburg, South Carolina.

South Dakota, at Sioux Falls, June 17-19, 1925. Secretary, G. G. Kimball, Mitchell, South Dakota.

Tennessee, at Nashville, June 15, 1925. Secretary-Treasurer, F. W. Meacham, 911 Hamilton National Bank Building, Chattanooga, Tennessee.

Texas, at Dallas, June 8-11, 1925. Secretary, R. L. Rodgers, Amarillo, Texas.

Wyoming, at Landers, June 29-30 and July 1, 1925. Secretary, Thew J. Ice, Box 116, Powell, Wyoming.

## MONTANA STATE DENTAL ASSOCIATION, INC.

The next meeting of the Montana State Dental Association, Inc., will be held at Great Falls, July 29-31, 1925.

H. G. Farrell, *Secretary*,
328 Rialto Bldg., Butte, Mont.

## MINNESOTA STATE BOARD OF DENTAL EXAMINERS

The next meeting of the Minnesota State Board of Dental Examiners will be held at the College of Dentistry of the University of Minnesota, Minneapolis, June 22-July 2. For application blanks and further information, address

R. B. Wilson, *Secretary*,
1133 Lowry Bldg., St. Paul, Minn.

## MISSISSIPPI STATE BOARD OF DENTAL EXAMINERS

The annual examination of the Mississippi State Board of Dental Examiners will be held at the state capitol, June 16, 1925.

Reuel May, *Secretary*,
Jackson, Miss.

## MONTANA STATE BOARD OF DENTAL EXAMINERS

The annual meeting of the Montana State Board of Dental Examiners will be held at Helena, July 13-17, 1925.

Marshall E. Gates, *Secretary*,
Helena, Mont.

## BOARD OF DENTAL EXAMINERS OF THE STATE OF WYOMING

The next meeting of the Wyoming State Board of Dental Examiners will be at Landers, June 29-30 and July 1, 1925. All applications must be in the hands of the secretary of the board fifteen days prior to the time set by the board for examinations to begin. Applicants must present a full plaster model of upper and lower with teeth, also one without teeth. Practical work will be required from all candidates taking the examination. The candidate is required to furnish his own operating instruments, dental engine, amalgam, gold, wax and modeling compound.

For further information and application blanks, address Thew J. Ice, *Secretary*,
Box 116, Powell, Wyoming.

# THE GORGAS MEMORIAL INSTITUTE

## DENTIST—PHYSICIAN—INDIVIDUAL

### The Triple Alliance to Prevent Disease

**By D. M. GALLIE, D.D.S., Chairman, Gorgas Memorial Committee, American Dental Association**
**Chicago, Illinois**

In the gallery of patron saints of the dental profession, a comfortable niche should be provided for William Crawford Gorgas, Surgeon General of the United States Army during the World War. General Gorgas was a sanitarian, a medical man and a great organizer; but most of all he was a man with a keen sense of proportion and an innate love of justice, best exemplified in the fact that, recognizing the high professional standards of the Doctors of Dental Surgery, he lent his cooperation to the legislative committee of the American Dental Association in the successful effort to secure the passage of the equal recognition bill, in October, 1917.

If General Gorgas had opposed the bill, the Dental Officers of the Reserve Corps undoubtedly would have been called on to render service for the duration of the war at a grade no higher than that of first lieutenant. But with his aid, for the first time in the history of the United States Army, members of the dental profession were accorded equal rank with the members of the medical profession.

General Gorgas gave his approval of the organization of a dental training camp at Greenleaf, Ga. The camp, which was established under General Munson of the Medical Corps, was the forerunner of the present professional postgraduate school for dental officers of the United States Army at Washington, D. C. General Gorgas also authorized the establishment of dental infirmaries in camps and cantonments, where men spent periods of training previous to going overseas.

The appointment of a representative of the American Dental Association to the General Medical Board of the Council of National Defense also had the endorsement of General Gorgas. Thus did he show himself ready to further a profession that has done much to aid itself in achieving high educational, ethical and professional standards.

The dentists of America are not unmindful of all that Gorgas stood for in general and of what he did for the standing of the dental profession in particular. Last November, at the annual session of the American Dental Association in Dallas, the Association endorsed the Gorgas Memorial Institute of Tropical and Preventive Medicine, which had been started by the friends of General Gorgas as a living memorial to the late Surgeon General, to perpetuate his ideas of sanitation, personal health and longevity. The program of the Gorgas Memorial Institute calls for a nation-wide educational campaign of instruction in the wisdom of the ounce of prevention. Thus will the people be taught to consider the body as something to be kept constantly in condition, rather than something that must be repaired when it breaks down. This is a program that dentists can endorse, since we constantly urge our patients to come in for periodic examination of their teeth. Not only can we approve of the work of the Gorgas Memorial Institute along these lines, but we can also give it our financial support.

As chairman of the Gorgas Committee of the American Dental Association, I reported at the March meeting of the executive committee a plan for furthering the work of the Institute and for the participation of dentists with physicians and surgeons in the personal health campaign. After this plan had been approved, it was my suggestion that state committees be appointed and subdivided into county and city committees and that each committee and subcommittee be assigned a quota for the support of the Gorgas Memorial Institute.

For those unacquainted with the Gorgas Memorial Institute, may I add that the Institute has the support of the leaders in the medical and dental professions as well as of prominent laymen. President Coolidge is the titular head of the organization, Dr. Franklin H. Martin of Chicago, the vice-president and chairman of the Board of Directors, and Dr. W. H. G. Logan, secretary. Other officers are: George M. Reynolds, treasurer, and Silas Strawn, attorney.

The Institute will raise a fund of $5,000,000 to endow the activities of the organization. At Panama, a research laboratory will be erected on a site furnished by the Panamanian government. The cost of the laboratory will be met through a bond issue of the Republic of

Panama, already voted. Thus, the Institute will be relieved of initial expense in carrying out its researches in tropical medicine. It is not proposed to establish a college or institute in the United States. The plan is rather to carry directly to the people the message that the secret of longevity lies in physical fitness. This is now being done through newspapers, magazines, the radio and other mediums best calculated to enlist lay cooperation in this most important work.

General Gorgas helped the dental profession when it came to a test, in 1917, and the undying part of the man, his genius and his ideas, going forward by means of the Gorgas Memorial Institute, will serve humanity by educating the masses to the vital part medicine, surgery and dentistry play in the program for personal health. The Memorial is significant of an era in which the fight to conquer disease will be backed by a triple alliance: physician—dentist—individual.

Associate members of the Gorgas Memorial Institute Committee of the American Dental Association are: Drs. W. D. Tracy, New York City; Russell W. Bunting, Ann Arbor, Mich.; H. E. Friesell, Pittsburgh, Pa. and Eugene R. Warner, Denver, Colo.

## SOCIETY OF PROGRESSIVE ORAL ADVOCATES

The eighth annual meeting of the Society of Progressive Oral Advocates will be held in the Detroit Day School for the Deaf, Detroit, Mich., June 11-13, 1925.

## MARQUETTE UNIVERSITY CLASS OF 1919

The class of 1919 of Marquette University will hold their first reunion during the Wisconsin State Dental faculty meeting, at Madison, Wis., July 14-16, 1925.

R. P. PHELAN, *Chairman,*
Milwaukee, Wis.
H. F. PECK, *Sec'y-Treas.*

## AMERICAN SOCIETY OF ORAL SURGEONS AND EXODONTISTS

The seventh annual meeting of the American Society of Oral Surgeons and Exodontists will be held, September 18-19, 1925, at the Brown Hotel, Louisville, Ky. Members of this organization desiring more detailed information regarding local arrangements will please write to

E. C. HUME, *Chairman,*
Local Committee on Arrangements,
814 Francis Bldg., Louisville, Ky.

## REDUCED FARES TO LOUISVILLE MEETING

A round-trip Identification Certificate will be sent to each member of the American Dental Association.

This certificate, when presented to your local ticket agent, will authorize his to sell tickets for the round trip, Louisville and return, at one and one-half fare, for yourself and dependent members of your family. Tickets will be good via same route in both directions.

Tickets will be on sale, September 16-22, good returning until midnight, October 1, 1925.

Summer excursion tickets from the Western Coast territory, on sale May 22 to September 15, good returning to October 31, will be available for this meeting.

D. C. BACON, *Chairman,*
Transportation Committee.

## AMERICAN DENTAL HYGIENISTS' ASSOCIATION

The American Dental Hygienists' Association will meet in Louisville, Ky., Sept. 21-25, 1925.

## FEDERATION OF AMERICAN WOMEN DENTISTS

An interesting history of the first women in the practice of dentistry is being compiled by the Federation of American Women Dentists under the supervision of Dr. Vida Latham, 1644 Morse Ave., Chicago. She is asking the assistance of every woman in collecting the histories of these pioneer women.

Dr. Juanita Wade, President of the Federation of American Women Dentists, is preparing a splendid social program for the meeting at Louisville and it is hoped that every woman dentist attending the convention will avail herself of the privileges connected with this organization.

M. EVANGELINE JORDON,
Los Angeles, Calif.

## BELGIAN CONGRESS OF STOMATOLOGY

The Belgian Congress of Stomatology, which will be of international character, will meet in Brussels, July 11-14, 1925. The program will deal with theory and practice, and articles on focal infection, the pathology and treatment of cancer of the mouth, and the importance of the vitamins will be presented by leaders in those fields of research.

Titles of papers must be sent in before June 1. Membership is granted to (1) all Belgian or foreign physicians interested in stomatology, who must be presented to the committee on membership, and to (2) all Belgian or foreign dentists presented to the committee. Dues for membership are 50 francs. Each member is entitled to a copy of the proceedings of the congress.

Further information may be obtained from
DR. RENE BOISSON, *Secretary,*
35 Rue Belliard, Brussels, Belgium.
DR. J. POLUS, *Secretary,*
18 Rue du Commerce, Brussels, Belgium.

## PRIZES FOR ORIGINAL DENTAL RESEARCH

*Morris L. Chaim Prize:* The First District Dental Society of the State of New York announces the establishment of an annual cash prize for original dental research. This prize is made possible by the generosity and public spirit of the late Morris L. Chaim, who bequeathed to the First District Dental Society the sum of $5,000, the interest therefrom to be awarded annually as a prize for original dental research. The conditions are as follows: A thesis must be presented to the First District Dental Society, 250 West Fifty-seventh Street, New York City, accompanied by a suitable description of experimental work and bibliography. Material for the first award must be submitted not later than Jan. 31, 1926. The award is not limited to members of the dental profession.

*First District Dental Society Prize:* In addition to the Morris L. Chaim prize, the First District Dental Society will award annually a cash prize of $250. This prize will be awarded to that contribution submitted for the Morris L. Chaim prize, which in the judgment of the committee shall have the most valuable immediate practical application to the practice of dentistry. The names of the judges will be published at an early date.

ALFRED WALKER, *Chairman,*
100 West 59th Street,
New York City.
LELAND BARRETT
MILO HELLMAN

## NECROLOGY AND RESOLUTIONS ON DEATH OF HENRY BARTON STOTT

Henry Barton Stott was born in Rochester, N. Y., May 31, 1890, and graduated from the high school of that city, in 1907, matriculating in the University of Pennsylvania, from which he received his degree of D.D.S. in 1911. He returned to Rochester to practice, continuing until 1918, when he was forced to seek rest and the benefits of a higher altitude. After three years, he returned to his work for a year, then went to New Mexico in a final effort to regain his health. Here, he died, after seven years. He lies buried in Lewes, Del.

WHEREAS, In the providence of an all wise Creator, our fellow member and associate, Dr. Henry Barton Stott, died, April 9, 1925; and

WHEREAS, Dr. Stott as a dentist and as a man possessed those qualities which in the crucible of life are assayed as gold of purest form: honor, integrity, love of life and fellow men and allegiance to the dictates of the highest and noblest precepts of life; his life fully exemplifying the philosophy of those words:

> It's easy enough to be happy,
> When life flows along like a song;
> But the man worth while
> Is the man who will smile,
> When everything goes dead wrong.

Now therefore be it

*Resolved,* That we the members of the Seventh District and the Rochester Dental societies feel deeply his loss and hereby express our appreciation of his worth, his friendship and his unflinching value in the face of adversity, and be it further

*Resolved,* That a copy of these resolutions be spread upon the minutes and sent to the members of his family and to the dental journals for publication.

JOHN T. MCINTEE,
EDWARD G. LINK,
GEORGE T. HARTER,
Committee, 7th District Dental Society.
HOWARD F. LEWIS, *Chairman,*
Rochester Dental Society.

## RESOLUTIONS ON THE DEATH OF JAMES B. MORISON

With the consent of the members of the American Society of Orthodontists, the Committee would like to recommend the following resolutions:

During the past twelve months, this society has suffered the loss of one of our most esteemed members, Dr. James B. Morison of Montreal. One of the first to give special attention to and teach orthodontia in Canada, Dr. Morison built up for himself an enviable practice in Montreal, where he made hosts of friends and was beloved by all who knew him. Of a modest, retiring nature, he always impressed one by his gentlemanly qualities. His volunteer service during the

World War was most efficient and highly characteristic of the man.

If we could have known that he was so soon to begin the Great Adventure, we would have loved to assure him of our faith in his courage to meet the inevitable, of our love for him as a man and a member of this society, and of our appreciation of the good work that he has done, of our knowledge of his faithfulness to duty, his cheerful assumption of responsibilities and his always pleasing personality.

There is only left for us the memory of a knowledge that he has "wrapped the mantle of his couch about his and lain down to pleasant dreams."

*Be It Resolved,* That, in loving remembrance, we tender these sentiments to his bereaved family, and spread upon the minutes this brief but lasting memorial of our affection and esteem.

(Signed)

HERBERT A. PULLEN, *Chairman,*
BURT ABELL,
GEORGE GRIEVE,
Committee on Necrology.

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## PATENTS OF INTEREST TO DENTISTS

1450016. Syringe, Wm. H. Bruce, Lansdowne, Pa.

1450025. X-ray apparatus, Edwin L. Edwards and F. A. Farwell, Indianapolis, Ind.

1449764. Broach, Victor E. La Pointe, Hartford, Conn.

1450103. Dental implement, Lora T. Melton, Marshfield, Mo.

1449459. Casting machine, S. J. Symmons, San Francisco, Calif.

1450055. Holder for collapsible tubes, A. H. Trumbull, Stratford, Conn.

1450012. Artificial denture, Louis J. Weinstein, New York, N. Y.

1450542. Rotary toothbrush, Roy C. Faust, Deary, Idaho.

1450419. Dental device for spreading tissues, Jay A. Heidbrink, Minneapolis, Minn.

1450420. Sensitized film holder for X-ray photography, Jay A. Heidbrink, Minneapolis, Minn.

1450639. Dental impression tray, George S. Monson, St. Paul, Minn.

145 05. Artificial teeth, Nilsen Bercka, Buenos Aires, Argentina.

1451533. Denture, Houston M. Carroll, Sr., San Antonio, Texas.

1451507. Gravity angle meter for dental radiography, L. E. Harris and T. A. Larch, Emporia, Kans.

1451425. Sterilizing holder for toothbrushes, R. F. Hurley and A. T. Twesma, Galesville, Wis.

1451320. Toothpick, Rudolph Thum, New York, N. Y.

1451806. Dental tool holder, Joseph E. Balrridge, Avalon, Pa.

1451809. Dental tool, George G. Bell, Ashland, Ky.

1452108. Toothbrush, John H. Carter, Cohoes, N. Y.

1452477. Dental articulator, Edward L. Chotte, Chicago, Ill.

1451941. Toothbrush and paste holder, Frederick H. Clum, Detroit, Michigan.

1451775. Toothbrush, S. B. Husch, New York, N. Y., and G. S. Husch, Brooklyn, N.Y.

1452299. Antiseptic container, Frank C. Leahy and G. H. Hileman, Detroit, Mich.

1451993. Rotary toothbrush, Charles McLellan, Sioux City, Iowa.

1452085. Dental syringe, David J. Machol, West New Brighton, N. J.

1452209. Disc grinder, John Miller, Jr., Beloit, Wis.

1451892. Articulator, George W. Reimche, Moorhead, Minn.

1451718. Adjustable attachment for removable bridgework, Isidore Stern, New York, N. Y.

1453006. Lighting means for surgical and other purposes, Emory C. Day, Laguna Beach, Calif.

1452878. Artificial tooth, Michael Karmann, Highland Park, Michigan.

1453149. Toothbrush, Andre Lenief, Paris, France.

1453151. Pocket sterilizing case for clinical thermometers, A. J. V. McDonnell, London, England.

1452761. Collapsible tube holder, W. H. Roberts, Detroit, Michigan.

1453194. Dental film holder, Arthur E. Shaw, Columbia, S. C.

1453314. Current regulator for roentgen-ray systems, Charles Fayer, New York, N. Y.

1453473. Roentgen-ray plate changer, R. J. McKenna, Denver, Colo.

1453415. Collapsible dispensing tube, Benjamin E. E. Stafford, Pittsburgh, Pa.

1453418. Hypodermic syringe, John A. Tessmer, Worcester, Mass.

1453816. Toothbrush holder, Walter W. Welpley, Detroit, Michigan.

1453303. Manufacturing plates for artificial dentures, Homer T. Yaryan, St. Petersburg, Fla.

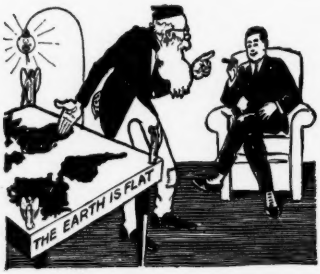
1454152. Dental film mount, Arthur W. Buck, St. Louis, Mo.

1454429. Dental floss dispenser, Frank G. Dresser, Providence, R. I.

Copies of these patents may be obtained for 25 cents each, by addressing John A. Saul, Solicitor of Patents, 509 Seventh St., N. W., Washington, D. C.

# "You're All Wrong, Mr. Ante-Date–All Wrong"

*By Ernest V. Madison*




WE HAVE all met the salesman who tells us that he can quote lower prices because his firm does no advertising.

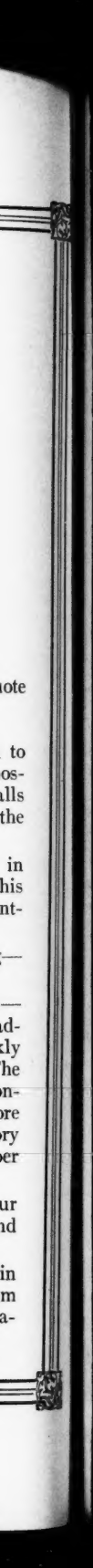
Let's ask him—*how* and *why*.

How much time does a salesman of a product not advertised to the trade use in explaining its construction, performances and possibilities? How much time does this salesman use in making calls where the buyer will not see him because he has never heard of the product?

Isn't there an expense connected with a salesman's time used in obtaining an interview and making an article known? Will not this expense be repaid to the manufacturer by being tacked to the eventual selling price?

We know that we, the users, pay for every expense of selling—along with the cost of manufacture—plus the maker's profit.

We also know that *advertising* is a quantity production method—and quantity production is economical. A single business paper advertisement introduces a product to thousands of readers as quickly as the salesman introduces an unadvertised product to one man. The shorter the time required of a salesman for educational or "missionary" work, the more time he gains for actual selling. The more customers the salesman obtains for the factory, the faster that factory grows and its facilities enlarge for producing at a lower cost per article.

Present these facts to the salesman who next comes into your place of business, boasting that his firm does not advertise and therefore can quote you lower prices.

And then tell him that you believe his firm should advertise in THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION. Let him know that you believe in the paper which gives you so much information essential to your business.